

DECEMBER, 1920

# THE METAL INDUSTRY

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THE ALUMINUM WORLD: COPPER AND BRASS: THE BRASS FOUNDER AND FINISHER  
**ELECTRO-PLATERS REVIEW**

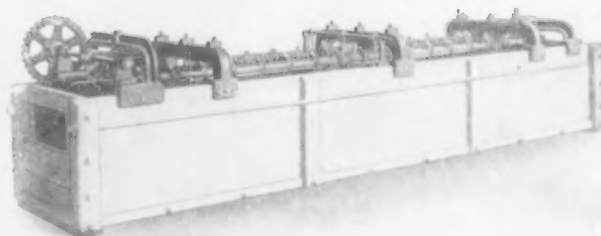
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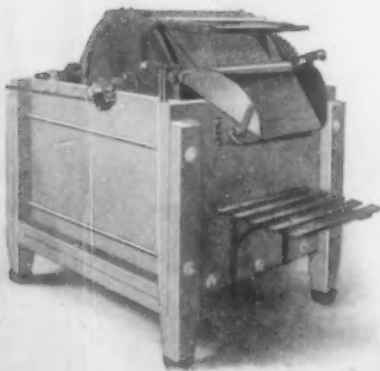


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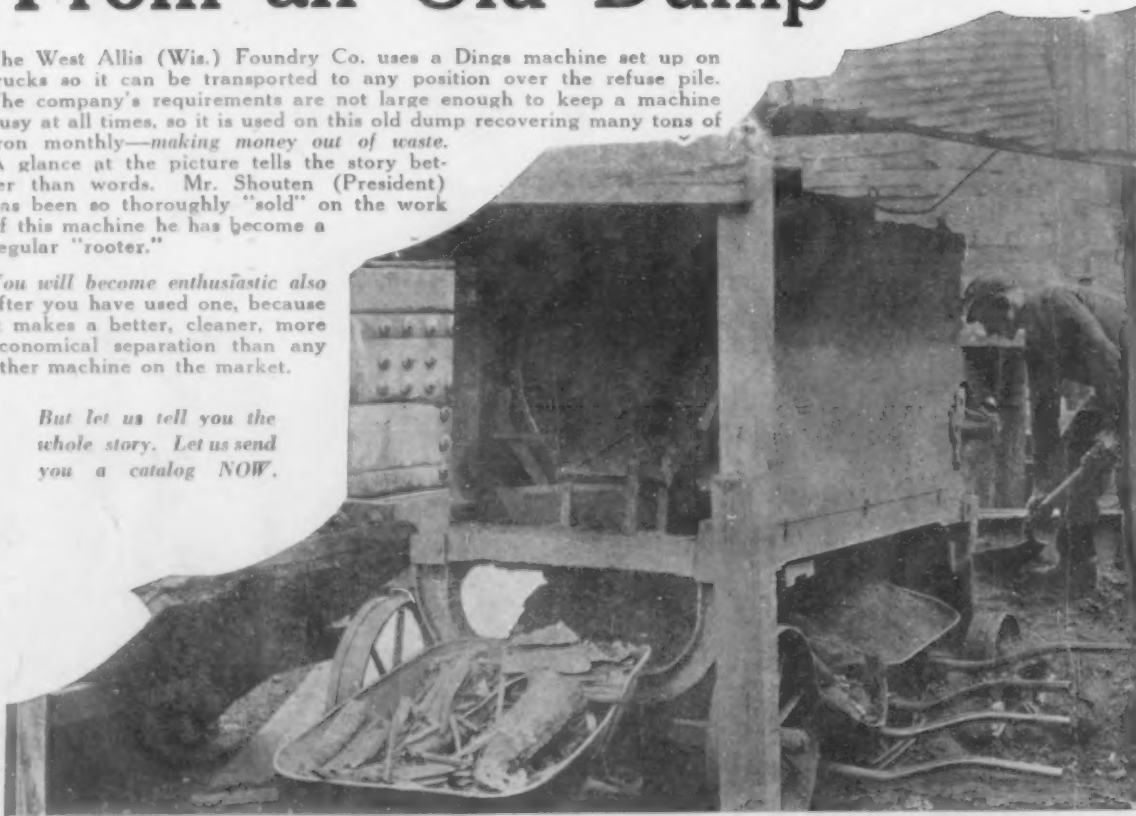
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# THE METAL INDUSTRY

WITH WHICH ARE INCORPORATED  
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ELECTRO-PLATERS REVIEW

Vol. 18

NEW YORK, DECEMBER, 1920

No. 12

## New Plant of the West Virginia Metal Products Corp.

### A Description of the Most Recent Addition to the Brass and Copper Rolling Mill Industry

About a year ago THE METAL INDUSTRY (November, 1919) published an announcement of the building of a new rolling mill in West Virginia, by the West Virginia Metal Products Corporation, Fairmont, West Va. At that time the company had just let the contract to the Fred T. Ley Company for a plant to have an eight hour minimum capacity of 80,000 pounds of finished brass and 20,000 pounds of finished copper.

The first unit of this plant to be set on actual work, was a pair of high speed finishing rolls, which were placed in operation September 25, 1920.

#### INCEPTION OF THE PROJECT

In many ways this mill is one of the most interesting ever built. It was not started like most other mills, by accident, or as the result of local custom, or because that particular section of the country was already a centre

where the coal comes out of the mine in skips which are dumped directly into the power house bins. It was decided therefore, that there should be an industry close to this power plant to take advantage of the unparalleled conditions. The question was what industry should be started?

After a thorough and most extensive investigation, it was decided to build a brass mill. Copper could be obtained in Baltimore, zinc from Clarksburg, W. Va., power was almost at its door, and the greatest markets in the country within 12 hours' reach. These facts stood out and decided the men who were behind the project in following their course.

#### GENERAL FEATURES OF THE MILL

There were at the outset, many difficulties. The land around the Fairmont section is very hilly. Large areas

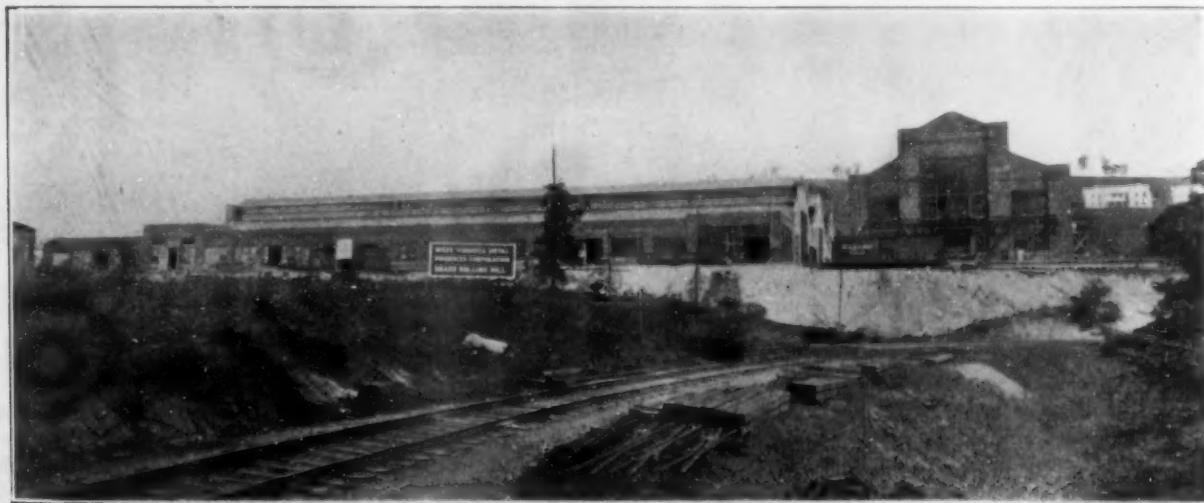


FIG. 1. VIEW OF BRASS AND COPPER ROLLING MILLS OF WEST VIRGINIA METAL PRODUCTS CORPORATION, FAIRMONT, WEST VIRGINIA. A TWELVE-FOOT RECEIVING AND SHIPPING PLATFORM EXTENDS THE ENTIRE LENGTH OF THE PLANT

of such an industry. It was quite coolly decided by a group of West Virginia business men that their particular section had possibilities for industrial development. The enormous natural resources, coal and gas, were too good to be given entirely to distant industries and it would be better to use them for local industry than to make far off shipments. The whole development started with a coal mine, one of those controlled by the Consolidation Coal Company of New York. Directly above this coal mine is the power house of the Monongahela Valley Traction Company. Here then is an ideal condition,

had to be cut away on the hillside to make room for the mill and on the other side, large spaces had to be filled in to level the ground. The foundations and the underground supports constituted a tremendous engineering project. A large amount of space underneath the buildings was left unfilled for various reasons such as, water drainage, storage space and in many cases it was cheaper to build extra piers than to fill in the whole ground.

Within three minutes walk from the mill, the company built about 200 houses for its employees. For those who do not live in these houses, a car line with a station at

the entrance of the mill connects directly with the town.

Aside from the main sections of the mill, the casting shop and the rolling mill proper, there are included an office building, laboratory, lunch rooms and locker rooms. The construction of the entire plant is steel, concrete and brick with reinforced tile roofing. Throughout the mill the windows are of the Fenestra type, the roof of the Monitor type, high enough to keep the air perfectly clear of fumes and gases.

#### THE CASTING SHOP CONSTRUCTION

The casting shop is a steel, brick and concrete building 280 feet long, 80 feet wide with a high roof of the Monitor type. The arrangement is such that there is room for quadrupling its capacity. The furnaces take up a space only half as long as the actual room for them on each side. Eight more furnaces can be placed alongside

ling feature, but it certainly seems to be justified.

#### OPERATION

The raw materials arrive by direct connection with either the Baltimore and Ohio Railroad or the Monongahela division of the Pennsylvania Railroad. They are taken from the cars into the receiving room where they are classified, sorted and conveyed to their respective bins in the metal storage of the casting shop. The charges are made up at the bins and are carried up an inclined runway to a raised platform behind the electric furnaces and placed in readiness for charging. The furnaces are eight in number; six Ajax-Wyatt, inductive type, 60 K.W., 600 pounds capacity and two, Bailey, resistance type, 105 K.W., 1200 pounds capacity.

After melting, the metal is poured directly into book molds held on a casting machine of the spider type, which consists of a turntable with six arms to hold the molds.



FIG. 2. A VIEW OF THE BASEMENT UNDER THE BRASS MILL FLOOR. THE SQUARE COLUMNS ARE USED FOR REINFORCEMENT TO SUPPORT SMALL ROLLS AND OTHER HEAVY MACHINERY

the existing installation and sixteen more on the other side of the casting shop.

Under the runway behind the furnaces is a room for the transformers where they will be out of the way and protected from dust and fumes. Shower baths for the casting shop help are also located under this platform.

The casting shop is floored with concrete, giving a very sturdy and smooth surface for conveying the materials to their respective stations. All hauling of charges to the furnaces, and cast bars and billets to the shears and scales, will be done by rubber-tired electric trucks.

A distinctive feature of the casting shop is, that it does not contain a single pit fire. No crucibles will be used as all the metal is melted electrically and poured directly into the molds. With eight furnaces, six of one type and two of another, it is impossible that all of them should break down at once. The only adverse possibility is that of power difficulties. It was decided that if this occurred, it would be necessary to shut down the mill anyway, thus making it useless for the casting shop to run. This absence of pit fires is an unusual, perhaps even a start-

These spiders can be moved from one place to another, complete with molds, by a crane, so that in case one casting machine gets out of order or it becomes necessary to change the size of the molds, it can be removed and another substituted in a short time. From the molds the metal in bars is taken to the shears where the feeder heads are cut off, then to the scales where they are weighed and the casting shop credited with its output, and then to the rolling mill.

#### THE ROLLING MILL OPERATIONS

From the casting shop the metal is carried by electric storage battery trucks to the breaking down rolls. These rolls like all the cold rolls in the mill, are driven by variable speed motors for selective speed regulation on different metals, widths and gauges. This arrangement has the advantage of great flexibility and efficiency in speed and production over the usual more or less constant speed drives in brass rolling mills, where production depends almost entirely on the amount the metal can be reduced in the individual pass through the rolls.



From the breaking down rolls, the metal is sent to the annealing furnaces which are of the underfired type, using gas or oil for fuel. The air for combustion is supplied by turbine blowers delivering 4,500 cubic feet of free air per minute and driven by 50 H. P. motors. The heat is applied to the metal through a perforated bottom and the gases are allowed to escape through vents in the top.

At the annealing furnaces the bars are loaded onto pans on steel wagons which are backed up to the rear of the furnace. The pans are pulled into the furnace by a special pan pulling apparatus, and after the annealing period, are pulled out of the other end of the furnace onto other wagons. These wagons stand on elevator hoists which are over quenching pits and are dropped into and lifted from the pits by this device. After quenching, the bars are put through a nine roll straightening

depending upon the gauge at which the metal is to be finished.

The pickling and washing operations which the metal goes through during and after the rolling on the finishing rolls, is done by electric hoists in concrete tanks which are lined with asphalt-mastic and acid-resisting conglomerate. The cooling operation at this period is done by sprays playing on the metal on the wagons as it is pulled from the furnace.

If it is desired to finish the metal in very thin gauges, it is run through high speed rolls, of which there are five sets and provision has been made for many more. Very high efficiency and a fine quality and accuracy of product is anticipated on these machines because of special arrangements and designs.

The finished coils which are to be delivered to the customers in a more or less annealed condition, will, after

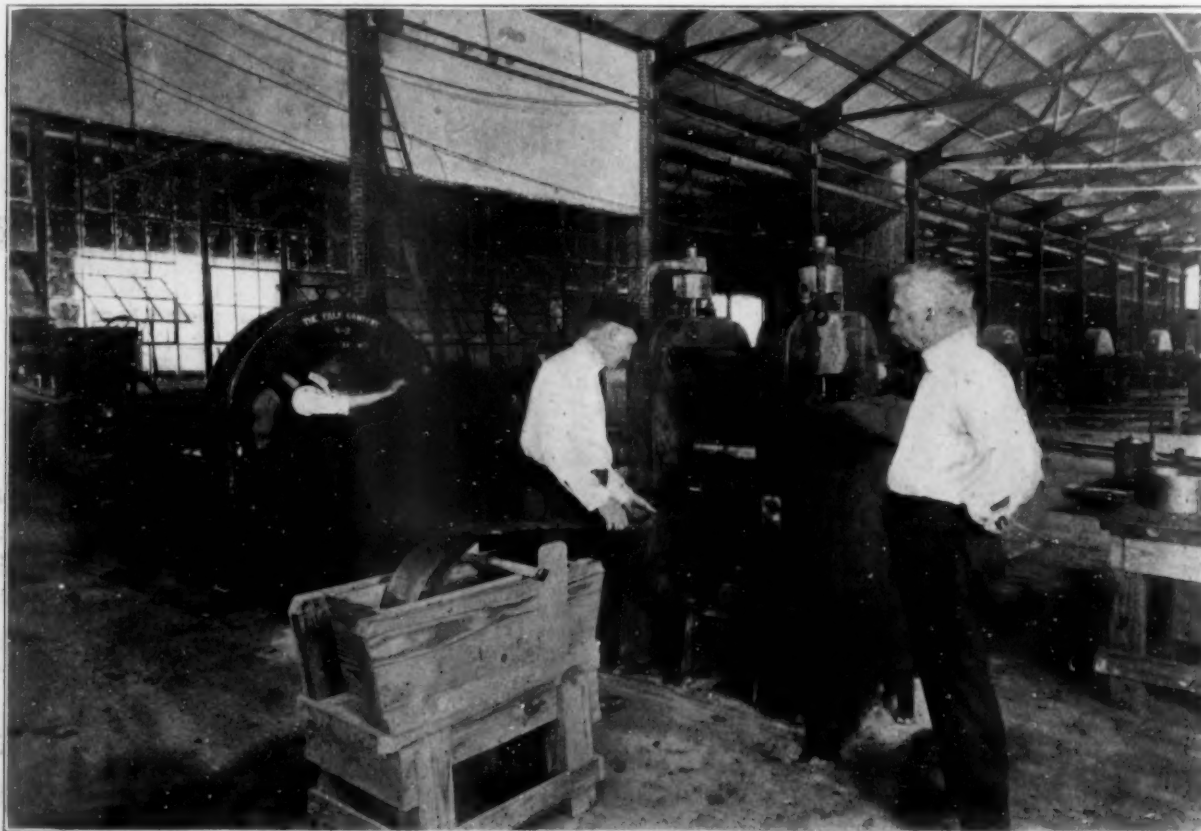


FIG. 3. FIRST BRASS ROLLING MILL TO OPERATE IN WEST VIRGINIA. A HIGH-SPEED FINISHING ROLL DRIVEN BY A VARIABLE SPEED MOTOR AT THE PLANT OF THE WEST VIRGINIA METAL PRODUCTS CORPORATION, FAIRMONT, W. VA., SEPTEMBER 25, 1920. W. J. PETTIS AT THE ROLLS AND L. J. KROM IN THE RIGHT FOREGROUND

machine. This machine has four upper and five lower rolls, each of the upper rolls being adjustable.

The metal is now ready for the milling or overhauling machines which remove the scale and other surface defects which the bars have acquired in casting and annealing.

After a series of running down passes through the breaking down rolls and the annealing and quenching which follows, the bars are sent through two sets of running down rolls also driven by variable speed motors, and are again annealed and either quenched, sprinkled or air cooled as desired for the particular alloy being handled. This operation is then followed by rolling on four sets of finishing rolls. The metal is then either slit and finished hard or soft as required, in the regular fashion, or re-annealed, pickled, washed and rolled again,

annealing, be pickled and washed in an automatic cleaning and pickling machine. This machine automatically unrolls the thin gauge sheet from a coil at one end (the machine takes care of three coils at one time, each with separate control) and runs it through the pickle solution over porcelain rolls, back and forth several times each way, out of the pickle, over a cleaning brush, through water, through a steam drier and onto a drum at the other end where it is re-coiled. All the work is synchronized and has individual control at both the starting and the finishing ends. The metal is then trimmed, its rough edges removed, slit and cut to size, packed and shipped.

#### COPPER MILL

Besides the cold rolling brass mills described, there are hot and cold rolling sheet copper and rod mills. The hot



copper mill is a very unique installation and is an innovation in the copper rolling field. It is a reversing mill of the type used generally in the steel industry. It is so arranged that instead of going through the usual practice of running the cake through the rolls and passing it back over the top, the metal runs through the rolls, the rolls are reversed and the metal runs back through the rolls again. This saves the difficult and costly business of lifting a large unwieldy sheet of hot metal over the top of the rolls. The rolls of the mill can be reversed at full speed in three seconds.

Two cake and plate heating furnaces have been installed for the hot mills. They are of the automatic pusher type, the cakes traveling through on water cooled pipes; the burners being placed at the discharge end of the furnaces, which are vented at the top. The cakes are passed to the hot rolls by an overhead carrier.

A billet heater is also installed for the hot rod mill.

general carpenter repair shop. All of these various departments are under the same roof as the mill itself, but simply partitioned off. It is easy to see that under these conditions a great deal of distance is saved in hauling and carting materials back and forth. The mill is built high enough so that there is no question of ventilation and is therefore very comfortable to work in. There is no crowding. The units are placed far enough apart so that there is sufficient space for storage of metal for a time, near any of the units, whenever it is found necessary. Space has been left for additional growth under the same roof, and the mill is so located that it can be expanded along the same lines as it has been begun, without any alterations of the existing sections.

The floor of the mill is made up of tongue and groove brick grouted with cement on two inches of sand, underneath which is an eight inch concrete base. With such a sturdy and permanent foundation, there is no difficulty

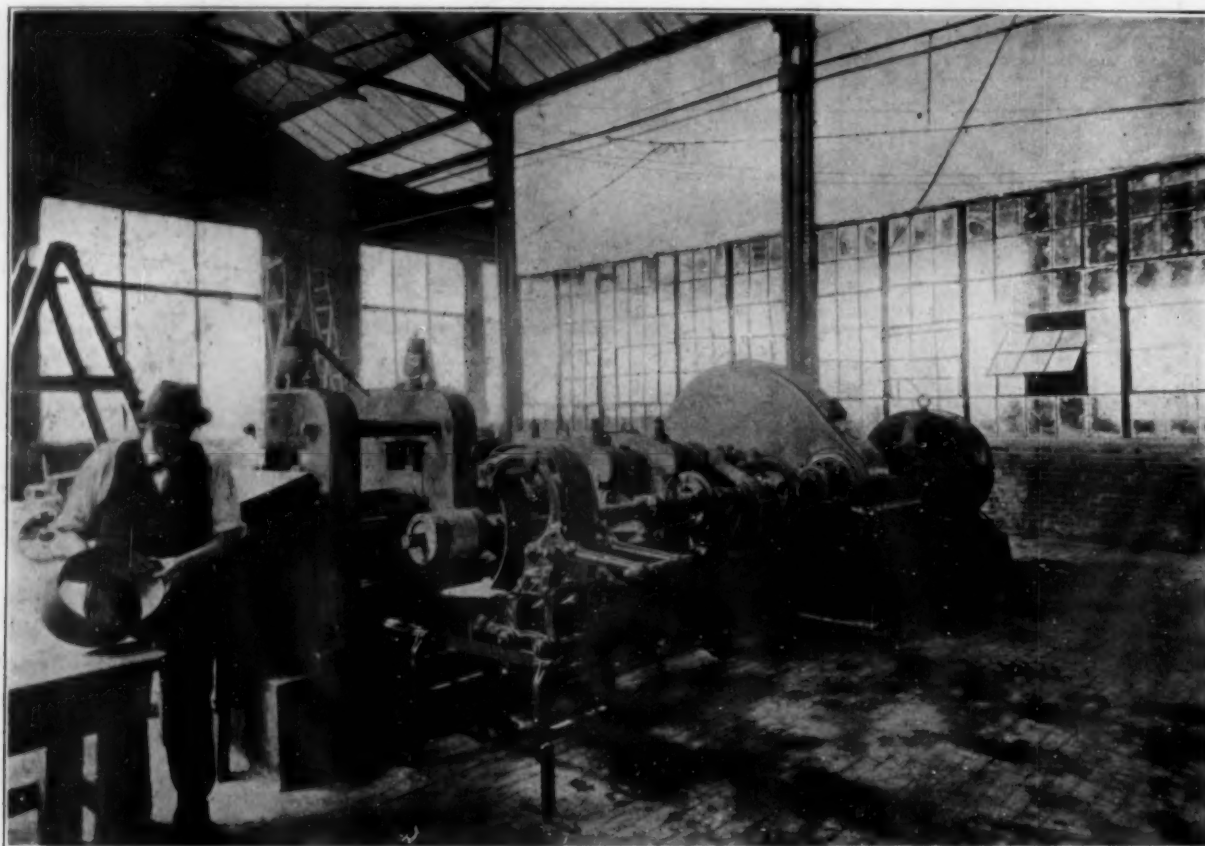


FIG. 4. RECEIVING SIDE OF ROLLS SHOWN IN FIG. 3. FERDINAND DEMING THE DEAN OF ROLLING MILL ENGINEERS IS "DISCOVERED" IN THE LEFT FOREGROUND

The hot billets will be rolled on grooved rod rolls, from 3 inches to  $\frac{1}{2}$ -inch, and cold drawn from  $\frac{1}{2}$ -inch to the size desired, on draw benches and bull blocks.

The copper sheet and rod departments are not yet ready for full description, but this will be published in a later issue of THE METAL INDUSTRY.

#### SPECIAL FEATURES

This, in a rough general way, outlines the operations which the metal undergoes in its changes from raw material to finished product. However, a number of points about the mill are unusual and will bear special mention. There are many auxiliary departments, among which are included the blacksmith shop, machine shop, roll grinding shop, polishing shop, storage battery charging station, store rooms box making shop for shipping boxes and

about the use of trucks for the hauling and moving of metal, and as a matter of fact, all of this work is done by electric storage battery trucks. There are no cranes in the rolling mill but simply a large number of these "free lance" carriers, which can be moved at will from any part of the mill to another. There will be sufficient number of these trucks in operation so that the movement of materials will never be held up for lack of transportation. There will be no waiting for cranes, a condition far too common in most mills. An interesting feature of this particular make of storage battery truck is the fact that it is as nearly fool proof as seems possible. It is arranged so that it can lift its load and start at the same time, completing its lifting job while getting under way. In order to run the truck, the operator presses down a lever with his left foot and keeps it down. If

there is an accident which throws him off the truck, this lever springs back into its original position and stops the truck at once. In the same way, if the operator should find it necessary to stop the truck quickly, all that he needs to do is to remove his foot from the pedal.

The cooling water from the cake and billet heating furnaces is conveyed through the pickling and into the rinsing tanks to keep them hot.

A very special feature of the electrical equipment is, that the selective speed motors which drive rolls and similar direct production machinery, have on their control boards, meters which will give accurate records of power consumption. This will enable the cost department to obtain much more accurate data on the costs of the various kinds of material produced than has been possible up to the present time.

All the annealing furnaces are fitted with a complete complement of indicating and recording pyrometers. This pyrometer equipment has been selected for its accuracy and reliability and it will assist greatly in obtaining a very exact heat treatment of the metal. This is particularly desirable in the regular process annealing in order that the metal may always go to the rolls in condition most desirable for that operation, and also that the product may be of the very best quality. This is also very interesting to customers for it insures them a fine quality of material with the exact characteristics they need.

Another feature of the plant which will be of particular interest to customers, is the metallurgical department. A very complete laboratory equipment has been installed by means of which the quality of the product will be regulated, from raw material to the finishing operations. A very thorough investigation will be made by this department of the requirements and needs of the various customers and by the regulation of mill operation, will insure the production of material which will conform to the requirements of the operations of the customers. Extensive chemical, physical and metallographic tests will be made on all material and complete records so kept, that customers will also be assured of duplication of a satisfactory product from order to order.

#### COMPLEMENT OF SHEET MILL

The following machines were made by the A. Garrison Foundry and Machine Company of Pittsburgh, Pa.:

- Breaking Down Rolls.
- Running Down Rolls.
- Hot Copper Reversing Mill.
- Hot Double Mill.
- Double Cold Copper Finishing Mills.
- Copper Stretcher for flattening sheets.
- Copper Shears.

Finishing rolls and the high speed rolls for thin metal were made by the Philadelphia Roll and Machine Company, Philadelphia, Pa.

Alligator shears from the Canton Foundry Company, Canton, Ohio.

Scrap bundling press from Logeman Brothers, Milwaukee, Wis.

Blockers and coilers from J. Menzer, Taunton, Mass., and The Sundh Engineering and Machine Company, Philadelphia, Pa.

The casting apparatus consisting of the spiders and molds, was made by the Sessions Foundry Company, Bristol, Conn.

Slitters are from Blake and Johnson, Waterbury, Conn.

The machine shop equipment consisting of lathes, planers, shapers, milling machines, cranes, saws and bor-

ing mill, were bought from Barbour, Love and Woodward, New York, N. Y.

The crane in the casting shop of ten tons capacity, was made by the Niles-Bement-Pond Company, Philadelphia, Pa.

The pickle and water tank cranes were made by the Shepard Electric Crane Company, New York, N. Y.

The portable floor cranes, hand operated, were made by the Canton Foundry, Canton, Ohio.

The turbine blowers for supplying air to the annealing furnaces, were made by the Spencer Turbine Company, Hartford, Conn.

The nine roll straighteners were made by the Sundh Engineering and Machine Company, Philadelphia, Pa.

The following machines were made by the Torrington Manufacturing Company, Torrington, Conn.:

- Automatic milling and overhauling machines.

- Copper cleanser which passes the sheet through a cyanide solution and leaves it with a pink satin finish.

- Automatic plate trimmer.

- Gang saw.

- Thin metal flattener.

The Medart straightener was made by the Medart Patent Pulley Company, St. Louis, Mo.

The automatic pickling and cleaning machine was made by the Sundh Engineering and Machine Company.

#### COMPLEMENT OF ROD MILL

Rod mills, built by A. Garrison Foundry Company.

Draw benches, built by the West Virginia Metal Products Corporation, after the design of Ferdinand Deming, engineer.

Shuster straighteners, from the L. F. Shuster Company, New Haven, Conn.

Bull blocks, from the Standard Engineering Company, Ellwood City, Pa.

Rod thrashing barrel, by Henderson Brothers, Waterbury, Conn.

Single block wire machines, from the Morgan Construction Company, Worcester, Mass.

#### GENERAL EQUIPMENT

The electrical equipment of the mill such as motors, generators, transformers, etc., were manufactured by the Westinghouse Electric and Manufacturing Company, Pittsburgh, Pa., with the exception of:

Motors on the Sundh pickling machines, which were made by the Otis Elevator Company of New York;

Motors for the electric hoists at the quenching tanks, which were made by Yale and Towne, Stamford, Conn., who also furnished the hoists;

Motors for tilting the Bailey furnaces, which were made by the General Electric Company, Schenectady, N. Y.

All annealing and heating furnaces were built by the W. S. Rockwell Company, New York, N. Y.

The Ajax-Wyatt induction type melting furnaces were built by the Ajax Metal Company, Philadelphia, Pa.

The Bailey resistance type melting furnaces were built by the Electric Furnace Company, Salem, Ohio.

#### OFFICIALS AND STAFF

The financial management of the company is in the hands of the following men:

Samuel S. McRoberts, chairman, Board of Directors; Geo. W. Fleming, president; James M. Boyle, vice-president; W. B. Irvine, vice-president; M. L. Hutchinson, vice-president; J. F. Caulfield, secretary and treasurer; Roland Kniffler, assistant treasurer; O. E. Schwartz, assistant secretary. The Executive Committee



is made up of Geo. W. Fleming, J. M. Boyle, W. B. Irvine, Geo. M. Alexander, C. W. Watson.

The officials of the company are Geo. W. Fleming, president; Major James M. Boyle, vice-president and general manager; J. F. Caulfield, secretary and treasurer; J. F. Hunsaker, assistant secretary and treasurer.

Major Boyle, of 14 Wall street, New York City, has had the whole project under his supervision since its inception, acting as engineer, vice-president and general

of mills in Canada, England and Spain. Among the mills in the United States which he planned and built are the Rome Brass and Copper Company, Rome, N. Y., the U. S. Copper Products Company of Cleveland, Ohio, and in Canada the mills of the Dominion Copper Products Company at Montreal.

While in Birmingham, England, he Americanized the the seamless tube mill of Allen, Everett & Sons, Smethwick, near Birmingham, and this plant did yeoman serv-



J. M. BOYLE



L. J. KROM



W. J. PETTIS

manager. He is an engineer of wide reputation and has long been connected with Fairmont in the designing and operation of gas producer plants, electric power plants and other large undertakings; designed to develop the industrial resources of West Virginia. He has not confined his attention to Fairmont, but his work has been extended to include such cities as Wheeling, Parkersburg, Clarksburg and Charleston.

#### MILL STAFF

The mill staff consists of L. J. Krom, works manager; W. J. Pettis, assistant works manager; Ferdinand Deming, mill engineer; A. Hewitt, master mechanic and chief electrician; E. S. Strang, metallurgist; F. E. Weaver, transportation superintendent; Geo. H. Benson, finishing roller.

Louis J. Krom, who is taking personal charge of the mill as works manager, has had a long career as a rolling mill expert. After his graduation from Lehigh University he spent more than ten years in the rolling mills of New England. In fact, he was one of the first rolling mill chemists in Westbury, Conn. In 1908 he became managing editor of THE METAL INDUSTRY, where he spent eleven years. He is widely known for his articles on rolling and manufacturing.

Ferdinand Deming, the mill engineer, who is largely responsible for the designs and selection of equipment of the plant, is one of the best known rolling mill engineers in America. He was at one time a rolling mill mechanic in Waterbury and through his designing ability became "a famous Waterbury master mechanic."

Mr. Deming's reputation is in fact international, for he not only designed and built mills in the United States, but also designed and improved the machinery

ice during the great war. In England it was said of him that he made "two blades of brass grow where one grew before."

William J. Pettis, the assistant works manager, is another Waterbury, Connecticut, product. Starting back in 1895 he spent twenty years in the service of The Randolph and Clowes Company, rising from pickle tubs to superintendent. In 1915 he went to Lisbon, Ohio, to put in and run a brass rolling mill for the production of cartridge shell blank at the plant of The National Brass & Copper Company. At the close of the war he specialized in the electrical melting furnace field for the Electric Furnace Company of Alliance, Ohio. He thus brings to the West Virginia Metal Products Corporation a wealth of varied experience and a mature judgment which will be a strong factor in the success of the new plant.

Elmore S. Strong, the metallurgist, is a graduate of Purdue University, Lafayette, Indiana, and received his business education with the American Brass Company, first at Kenosha, Wisconsin, and later at Waterbury, Connecticut. He became connected with the Baltimore Tube Company, Baltimore, Md., at the beginning of the war, and finding greater scope for his activities he identified himself with the West Virginia Metal Products Corporation in July of this year.

Fred E. Weaver, transportation superintendent, after finishing his high school and college education, became an expert in traffic and transportation matters while in the employ of the New Jersey Central Railroad at New York City. This training eminently fits him for the solving of the multitudinous traffic problems confronting an "infant in arms" of the brass business.



FERDINAND DEMING



## Casting Shop Costs

How the Pit-Fire Methods Can Be Improved and Cost Cut

By CASTER

It is quite common to find those contemplating changes in manufacturing processes, through a desire to reduce costs and increase production, turning to new and entirely different methods and equipment before exhausting the possibilities of the process they already have. For example, there seems to be a widespread idea among many engineers that the only ultimate ideal in industrial heating lies in the application of electricity and that to get "accuracy," "scientific control," "uniform temperature," "maximum heating efficiency," etc., it is necessary to have an electric melting furnace. This idea is largely due to lack of knowledge of the true principles of heating, furnace design and operation. It would be impossible, not to say out of place, to outline these principles in this paper, but those interested will find a clear statement on the subject in "Heat Treatment of Steel" (Bullens). The remarks therein, not only apply to heat-treating furnaces, but to industrial heating in general, including melting.

A specific, and very common, instance of this failure to consider more carefully the possibilities of an existing practice, lies in the crucible process of melting non-ferrous metals. Those who are faced with the necessity of cutting down melting and casting costs and increasing production, are very prone to dismiss the subject by concluding that the crucible method must go in favor of an electric furnace installation. The fact of the matter is, however, that the possibilities of the crucible process have not by any means received sufficient attention. In the first place, coal and coke can be replaced with gas or oil with remarkable reductions in labor and increased production, with the retention of the flexibility and control, due to the small units employed, characteristic of the crucible process.

Even with the oil standard practice using coal and coke pit furnaces, great improvement can be made. Suppose, for instance, it is desired to evaluate the existing practice in a brass melting shop with the idea of determining where economies could be effected; it is necessary to consider the following factors which govern to a large extent the cost and quality of product:

- Design and construction of the furnaces;
- Organization and personnel of the shop;
- Crucibles;
- Nature and quality of the fuel;
- Methods of handling metal and castings.

There are many brass melting pit furnaces designed and built by "home talent" without regard to the principles of heat application, height and diameter of the stack, flue size and length, depth of furnace or pit from flue to grate bars, etc., and all require careful study and experience to secure the best results. A properly designed and well built set of fires will sometimes give 50% more production than a poorly designed set.

Casting shop labor conditions are very unsatisfactory in many plants. The usual system is to have a "caster" in charge of a set of fires with two or three helpers, depending on the molds to be handled. The caster is usually over-paid and does comparatively little work. Where several sets of fires are in operation this system leads to lack of uniformity of product, because each caster will have his own way of casting and pouring, and standardization becomes difficult. A better system is to have an experienced, intelligent foreman in charge of the shop and to break in green men to do the pouring and

tend the fires and crucibles, etc. The method is quite feasible and will usually save several "casters" and will result in better control of the shop and greater uniformity of product. Many plants are practically at the mercy of their casting shops through having a number of independent casters who require to be pampered and petted while making "heroic" efforts to produce good metal. There is no mystery or black magic about producing good castings. A combination of metallurgical supervision, discipline and common sense is all that is required.

A crucible is a fragile, flexible object which will stand an astonishing amount of ill-treatment, but yet has its limitations. When cold it absorbs and retains a large amount of moisture from the air, which can only be driven off by prolonged heating at 300 or 400 deg. F. It is useless to heat the crucible for a few hours and then let it get cold and stand around for some time before using. In plants not having storage space on top of furnaces, or where these furnaces are not in continuous operation, a crucible heating oven, capable of holding at least a day's supply of pots, is an excellent investment. Careful attention must be paid to crucible tongs to see that they fit and do not get out of shape, and that they fit evenly all round. An iron anvil of the exact shape of the crucibles in use should be kept on hand so that the tongs can be hammered to shape frequently. After pouring is completed, the crucible should be put back in the fire as quickly as possible without being allowed to touch the floor. Erratic behavior and greatly varying number of heats is in nearly every case due to method of handling and treatment the crucible gets and is rarely due to the crucible itself. Of course, there are good and bad crucibles, but they are as a rule consistently bad or good, and if erratic results are obtained, the treatment they receive should be investigated before blaming the manufacturers of the crucibles.

A mixture of anthracite egg coal and coke is to be preferred. In the average shop a great deal of coal and coke is wasted through improper firing. In a large shop running on standardized products, firemen should receive instructions, and some form of bonus system can easily be arranged whereby economy in fuel can be secured.

It would require almost a volume to outline a proper cost system for a casting shop, best lay-out of weighing and scrap room, treatment of ashes, etc. This last subject is of great importance; it is obvious that ashes should be weighed from each set of fires, provision made for picking out coal and large pieces of metal, and when the quantity is sufficient, an ash treating plant installed.

We have outlined briefly some of the factors which will repay study in almost any plant. The point to be observed is that if the casting cost in a given plant is, say, 1.5 cents per pound, and granting that with a properly designed and built set of fires we can increase production 25%, through improving the practice in the treatment of crucibles, so as to obtain 25% greater number of heats, through attention to fuel economy, decrease the consumption of coal 10% and effect a 10% reduction in labor costs, we have reduced our casting cost to something like 1 cent a pound. Many still doubt if, with the flexibility required in the average shop, there is any cheaper method of melting and still maintaining the quality, unless a fluid fuel, such as gas or oil is used, instead of coal and coke.

## Notes on Brass Foundry Practice at Messrs. Vickers, Ltd. Barrow-in-Furness

Part 2 of a Paper read at a Meeting of the Institute of Metals held on September 15, 1920, at the Town Hall, Barrows-in-Furness, England

By H. B. WEEKS, F. I. C., Member of Council (Barrow-in-Furness)

**The Foundry.**—The architectural design of a workshop has much more to do with its efficiency than is generally supposed. Particularly does this apply to foundries where fumes, smoke, and dust are continuously mingling with the atmosphere in which the molders have to work. It is on that account, therefore, essential that spacious, well-lighted, well-ventilated, and lofty buildings should be erected for foundry purposes. The health of the workman is our first consideration when preparing plans for new buildings, as air space, good light, and ventilation are three necessities in the life of the molder and every other worker in the foundry.

**Size of Foundry.**—This foundry consists of two bays each 310 ft. long by 45 ft. broad by 40 ft. high; another bay 189 ft. long by 64 ft. broad and 40 ft. in height; a fourth bay 187 ft. long by 32 ft. broad and 28 ft. in height. The atmospheric capacity of the building is approximately two million cubic feet. One side of the roofing in each of the main bays is of glass, through which a clear light is obtained. There are also large glass panels in the west side of the foundry, and louvres, running the full length of the several bays, ensure the maintenance of a comparatively pure atmosphere.

**Cranes, Electric and Hydraulic.**—Molding operations are served by two overhead electrically-driven cranes, each of 15 tons lifting capacity, and two similarly operated cranes, one of 10 tons and the other of 5 tons lifting capacity. Erected at suitable positions in the shop are eleven hydraulic jib cranes, each with a lift of 3 tons; these are exceptionally suitable for the work they are required to do, as their operating involves no special degree of skill in manipulation, and they can be worked by boys.

**Drying Stoves.**—Situated at different parts of the foundry are eleven drying stoves, which are heated by producer-gas.

**Melting Plant.**—The metal-melting plant consists of two 7-ton and one 5-ton reverberatory furnaces, and forty-four crucible fires, the total capacity being 42 tons per day metal output.

**Molding-Boxes.**—The range of molding-boxes is most extensive and covers every requirement of the molding industry. Extensive preparations are at the moment being carried out to permanently take over a space outside the entrance of the foundry for their storage. All requirements by molders for their usage in the foundry will be served by an overhead travelling crane of exceptionally wide span, and which will fully cover the space referred to.

It is common knowledge amongst foundrymen that systematic treatment in the direction of shop tackle of every description is absolutely essential in the foundry, it being one of the keynotes of production. In order to afford quick access to pattern plates by the plate molders, large racks are built up to the shop walls for their systematic storage during any waiting period before or during manufacture. These racks contain numerous plates, and are divided into portions, each holding plates requiring a different method of attention, as, for instance, "dry-sand" or "green-sand" manufacture.

**Riddles and Sand Mixers.**—Electric riddles and

sand-mixing machines are placed within easy access, and workmen are kept busily employed feeding the hopper of the machines, whilst the sand already treated is being removed by the molders.

**Portable Mold Dryers.**—Portable mold dryers are also in use to skin dry "green-sand" molds of heavier nature for castings of extreme urgency, and are of great assistance in that direction.

**Crucible Coke-Fired Furnaces.**—There are, as already stated, forty-four crucible fires of a modified "Carr" type which are operated under good conditions, and which, we believe, have contributed in no small measure to the success we have achieved. They are served by two hydraulic jib cranes each of 5 cwt. lifting power, and each with an arc radius of 30 ft. Plumbago crucibles of 300, 200, and 150 lb. holding capacity are used, and are handled with dexterity by the experienced men in attendance.

**Ladles.**—Apart from the crucibles, there are ladles of 8, 5, and 3 tons, also a number of smaller type.

**Ash Washing.**—The skimmings from crucibles, ladles, &c., are carefully gathered up and taken to the washing department, whence, after separation, they are taken to the reverberatory furnace to be melted, one of the cast pigs from the melt of 5 or 7 tons being later drilled for analysis, in order to determine its composition for later use.

**Briquetting Scrap.**—These furnaces are also charged with briquettes, which are compressed by hydraulic pressure, and which are composed of turnings and borings of every description and form of brass. These borings and turnings, coming from the machine-shops, are wheeled to the hopper connected with the machine, and pressed into briquette form in order to facilitate handling in the charging into the melting-furnace.

**Railway System.**—The foundry is well served by the works railway system, having two sets of rails entering the shop. One of these takes the consignments from the dispatch department, and the other serves the spaces for wood, coke, and metal storage. A line also runs parallel the whole length of the foundry, in connection with sand deposits, scrap bins, pig beds, &c. The pig-running beds are situated outside the building, thus keeping the heat, fumes, steam, &c., away from the shop. A special portion is set apart for the white metal plant for the filling of bearings, and all such natures of repair to the works plant.

**Chemical Control.**—So far as the production of metal is concerned, which includes the making of all the alloys used and the supervision of the subsequent melting for casting purposes, this is all controlled from the chemical laboratory. The chief chemist and metallurgist also advises upon all purchases of raw material. He has control of the melting and mixing of all metals and their heat treatment, as well as of the physical and chemical tests to which the finished products are subjected.

The system applies to all foundries—steel, iron, brass, bronze, aluminium, &c.—in each case the man in charge of the melting and mixing is a trained metallurgist on the chief chemist's staff. Work of an experimental nature is constantly in operation and has resulted in the production of a number of special alloys, suitable for



numerous purposes. Amongst these may be mentioned what are now known as "high-strength brasses," but which were formerly called "manganese bronzes," upon which Messrs. Vickers were one of the first to experiment. These experiments led to the production of a "high-strength brass" that was stronger and more able to resist corrosion than most other similar bronzes on the market. This was a "high-strength brass" of the 60:40 type containing 2 per cent. of nickel and about 3 per cent. of manganese. The tests from sand-castings gave 15 tons per sq. in. yield, 32-36 tons per sq. in. tensile, with not less than 15 per cent. elongation on 2 in. This material was somewhat pale in color, however, which was the cause of further experiments being made to produce a bronze of richer tone. Although this was successfully accomplished, it became increasingly difficult to meet the Government demands for higher strength and yield point without resorting to artificial cooling of the test-bar.

Recognizing that such tests did not represent any portion of the casting, other mixtures were experimented with until one was obtained which fulfilled all the Admiralty requirements from a bar cut from any part of the casting. There is now no difficulty in obtaining from such a casting 20 tons per sq. in. yield, 40 tons per sq. in. ultimate tensile, and 20 per cent. elongation on 2 in.

Another special alloy that was manufactured here for many years is known as "Vickers Crown Metal," which has the appearance of German silver, and has been found of great value in cases where resistance to corrosion was essential. This also has a yield of 20 tons per sq. in., an ultimate tensile of not less than 35 tons per sq. in., with about 10 per cent. elongation on 2 in. This has proved of the utmost service for many parts of submarines and their engine fittings.

Much experimental work has also been done on white-bearing metals, and a number of white-bearing metal troubles experienced by some of His Majesty's ships while on service have been investigated and overcome.

It will be of interest here to record generally that the results of such investigations and the conclusions arrived at, which have proved to have been correct in subsequent practice, have been corroborated by the exertions of other workers who have been good enough to publish their results in the "Proceedings" of this Institute.

A large amount of experimental work has also been done on aluminium alloys suitable for pistons for internal

combustion engines. For many years, castings of an aluminium-zinc alloy have been made, giving resistance to tensile stress of about 20 tons per sq. in., but with practically no elongation. Such castings have in many cases replaced cast-iron ones with advantage. A large number of aluminium alloy castings have also been produced during the War to Air Board and other Government specifications. In all such operations, the control of pouring temperatures has been of the utmost service, and our experience has again corroborated the results that have been obtained by the Institute's investigators, who have published their results.

It will thus be seen that every endeavor has been made to work the foundry under scientific control, and it is satisfactory to be able to record how interdependent theory and practice have proved to be and how well theoretical investigations have been borne out in practice. This is as it should be. If theory, as applied to practice, is not borne out, there is something radically wrong with either the theory or the practice.

Many members will know that the alloy known as "duralumin" was first investigated at Barrow in this country, and its production has been of great service in the aeronautical world.

A few figures regarding the quantity of castings made during the five years covering the War period may be of interest.

Total output of castings from brass foundry.....	16,886 tons
Largest casting .....	23 tons 10 cwt.
Smallest casting .....	1 oz.
Total average of rejections for the five years.....	3 per cent

When it is considered that the whole of these castings have been made to Government specifications, and in numerous cases, in addition to the ordinary physical tests, have had to withstand high-water pressure tests, and also in many cases have required to be machined all over without showing any visible defects, it will, we think, be conceded that the above figures constitute the best proof available indicating the success that has attended the system adopted.

In conclusion, the author would express his indebtedness to Mr. W. Machin and Mr. J. Parker respectively, superintendent and chief foreman of the brass foundry here, for much of the information herein recorded. Also to Sir James McKechnie for his permission enabling these notes to be placed before the Institute, with the hope that they may prove of service to those members who are chiefly interested in practical foundry work.

## Etching Steel Blades

### RUBBER STAMP METHOD

What is termed the rubber stamp method is in general used for etching names, trade marks, designs, etc., upon steel knife blades, and other articles. The method consists of having a rubber stamp prepared with the design or mark required, which is used with a pad holding a strong caustic soda solution in the place of the customary ink. The resist or ground consists of a solution of gum ginacum dissolved in acetone or a similar solvent to the consistency of a varnish. The solution is best accomplished by the aid of a hot water or sand bath, as heat dissolves the gum more readily. A little aniline blue or violet should be added to the varnish so prepared.

A strong solution of caustic soda should be prepared, one pound or more per gallon of water. The ink pad should be kept moist with caustic soda solution.

The operation of etching consists of applying the gum ginacum evenly to the steel to be etched and allowing it to dry, moistening the rubber stamp with caustic soda from the ink pad, and applying it to the gum ginacum. The caustic soda eats through the gum and gives

the impression for the etching acids to work on.

After the caustic soda has eaten through the gum to the steel, wash it away with clean water and etch at once.

The etching acid is usually a dilute solution of nitric acid. For fine lines perchloride of iron is used, together with sodium bichromate as a neutralizing agent.

After etching, the articles should be placed in a hot caustic soda solution to dissolve the gum ginacum.

### TRANSFER METHOD

A similar method is termed the transfer method. The design is applied to a lithographic stone. Heavy black printers' ink is used. The transfer is made upon sun bleached tissue paper, and while the ink is wet the transfer is applied to the steel and remains until dry. The back of the tissue paper should then be moistened with wood alcohol, using a small sponge for the purpose. The paper can be removed from the steel and the ink impression for the etching remains.

Gauges can be arranged so that the exact location upon each article could be maintained. Cutlery manufacturers as a rule use the rubber stamp method.—C. H. P.



# The Woes of a Pattern Checker

His Duties, Responsibilities and Difficulties

Written for The Metal Industry by WILLIAM H. PARRY

There is a job that will more than hold its own with the baseball umpire for its nerve-racking possibilities—that of a Pattern Checker in a shop whose personnel is numerous enough to give the foreman and assistant foremen all they can do to see that the men are kept busy making patterns, without the added responsibility of their accuracy being thrust upon them.

Into this niche, between the upper and lower millstones is where the pattern shop checker fits, and it is usually up to him to avoid being ground "exceeding fine" between the executives on the one hand and the men on the other. It is a position that carries with it but little authority, and very great responsibility, in that he has no power to discharge the incompetent workmen, and yet if an inaccurately made pattern should happen to slip by his more or less deadly measuring devices, he is held responsible for all the trouble that follows this altogether too frequent event.

As no man is infallible, it follows that these self same checkers will fail at times to discover the mistakes of omission and commission made by the journeymen, and it is a "rare bird" indeed that can point with pride to an unsullied record.

Again, there is a difference of opinion as to what constitute the functions of a pattern shop checker. Some hold that he ought to be held accountable for the workmanship and "moldability" of the patterns, as well as their accuracy, thus relieving the foremen and their assistants of the necessity of doing anything but holding out their hands to grab the check when the ghost walks. The journeymen whose work must pass the checker have various opinions as to his functions, the most popular of which seem to be that he has made a bad choice of his vocation and that he would be better employed stacking cargo in shipholds, or as an ironworker on the fifty-first story of a skyscraper, being suspended the while by a ten-strand cable with nine strands broken.

The proper functions of a checker is to check and play no favorites, and I mean by checking not only the measurements but the presence of the "constantly present" pattern shop bugaboos, back draft, no draft, too little and too much draft. To be a first-class checker means that one must be a first-class mechanic of long and varied experience, and capable of sizing up the requirements of the patterns he is measuring. Certainly he will not split hairs when measuring sash weight, mud-hooks, pig molds and sewer cover patterns.

Again, there is a middle class of patterns that will allow latitude insofar as the necessity of close measurements are concerned, and the judgment of an experienced checker is worth more than all the knowledge that all mechanical engineers in the world have together ever can be. There are patterns, of course, that must be made as correct as it is humanly possible, but what is there to it, if, after the pattern passes the checker as O. K., it is a "loose" pattern, and subject to the bench or floor molder's rapping bar.

This induces another thought. Must the checker allow for the rapping of the pattern when it is not on a pattern plate?

As in all vocations, there are tricksters who "get away with murder" as checkers, and I am reminded of one case where a floor plate pattern had as one of

its dimensions a length of six feet, and the checker, who was also the boss and journeyman in this instance, had made it shy one-half of an inch in length. This did not feaze him in the least, as he ground enough off the end of an old shrink rule to make up the difference when laid three times on the pattern, and convinced the customer who witnessed this high-handed proceeding, that a good astronomer was spoiled in the making of that checker.

Breathes there the man with soul so dead who never to himself has sympathized with the poor simp who is in command of a pattern shop employing a goodly number of men, and who is compelled to do his own checking, because the manager or superintendent is not progressive enough to realize that the appointment of a good checker means efficiency, and in the end economy, even if the checkers' wages are half again as much as the journeymen's? As a matter of fact the wages or salary paid to pattern checkers should be not less than that of a Congressman, and somewhat more than a member of the Cabinet receives.

It was not so many years ago when I was holding down a job as foreman patternmaker at a plant specializing in water measuring machines and internal combustion engines. Most of the patternmaking there was of a very exacting nature, but there was a job or two now and then that would be classed as of the rough and ready type, such, for instance, as a turntable and its housing. This job was given to an alleged patternmaker, who after spending a lot of good lumber and time proudly announced to me that the job was ready for my "measuring stick." I hadn't got very far when I discovered that the railroad track gage on the turntable and its housing did not jibe by a matter of six inches!

As I had not at that time ever caught up with an industrial railway car that was gaited to fit variable track gages, we had recourse to the only satisfaction that a foreman gets, by making firewood of that turntable, though one of the superintendents (and they grew as thick as huckleberries there) thought that the better procedure would have been to make firewood of the patternmaker, and I believe he thought the same of the foreman patternmaker, who was also the checker.

There is another breed of pattern checkers who do not deign to lower themselves by working in a pattern shop, NOT THEY. I refer to the strutting jackass who is given charge of a gang of toolmakers to make metal patterns that must be so precise that an ordinary patternmaker (metal or wood) could not even approach the work on bended knee. These men scorn to use the shrink rule, preferring micrometers or vernier reading calipers in their efforts to produce moldable patterns, that are so accurate usually that they cannot be molded, as everything has been sacrificed to accuracy. Who of us has not met this excuse for a mechanic, with a micrometer in his upper coat or vest pocket, who talks in quarters of thousandths and thousandths, when we know that if given a cord of wood and the best lathe and tools in the country he could not turn a core print good enough to pass an ordinary pattern checker let alone one such as he claims to be.

# Nomenclature and Standardizations of Metals and Alloys

Compiled and Translated from the Zeitschrift für Metallkunde for

The Metal Industry by R. E. SEARCH, Metallurgist

In view of the work now being done by Committee B-2 of the American Society for Testing Materials, the following account of the efforts of German metallurgists and manufacturers along the same lines presents many points of interest.—Ed.

Some years ago Dr. Rosenhain, in the Institute of Metals of Great Britain, Dr. George K. Burgess and C. Powell Karr of the American Institute of Metals of this country, published several articles (all of them republished in full in the columns of THE METAL INDUSTRY) on the nomenclature of non-ferrous alloys, and now the German scientists and foundrymen have taken up the matter extensively and published their views, which will be seen upon reading this article to be less theoretical and more practical in their advices and discussions than any that have been made public upon this important subject.

At the meeting of the German Metal Foundrymen's and Miners' Association, December, 1919, Marine Architect Schulz discussed the general point of view in the "Nomenclature and Standardization of Metals and Alloys" and the present condition of this work. He started from the evolution of the standardization in general of machine work, which during the war was required on account of the necessary quantity of manufacturing under way, and through the energetic working of the German Engineers' Union for the creation of a central station for works regulation. All of these conditions and considerations postponed the presentation of data for the standardization of metals and alloys.

The divergence hitherto existing in such standards depended chiefly upon the following points:

1. The apprehension of such modes of action by the Council Board.
2. The disturbance of the industry by a change of position of other alloys.
3. The ultimate abandonment of special alloys which were held more or less secret by a number of firms.
4. The restraint in the evolution of new alloys.
5. The apprehension of the introduction of insufficiently tested alloys.

This list shows that according to the kind of composition, the normal selection of the chief representatives of the industry, the circle of consumers and the dabblers in learning, these apprehensions, for the most part, amounted to nothing. On the other hand, he calls attention to the advantages of the proposed regulations:

1. Greater economy in considering the manufacturer.
2. Better market in foreign countries.
3. More rapid adaptation to some extent to foreign regulations already introduced.
4. Relief of the consumer in the choice of suitable alloys through the enlightening activity of the committee, and the publication of suitable compositions concerning properties, spheres of application, etc., for metals and alloys.
5. Preference of domestic metals in consequence of the wider experience gained through investigation during the war (for example, with zinc and aluminum alloys).

The present state of the works regulation about brass, bronze, aluminum and copper has been published in Metall und Erz and in Der Betrieb.

To supplement the account of the activities in the selection made below up to date for metals and alloys for the German industry, it is possible to report briefly the work of the committee of May 22, 1919, and of Sept. 10, 1919.

A number of the prominent metallurgists and foundrymen took part in the discussions and the arrangement of the program.

Point 1. Corresponding to the Merchantmen's regulations for brass and bronze, (the proposal of Dr. Doerinckel), brass is to be indicated as a copper zinc alloy, of which intentional mixtures are not to be included, and this met with universal agreement. A further consideration was the designation of special brass, by means of which intentionally added mixtures are characterized as brass, the additions mentioned first, are manganese, brass, etc., according to the analogy of nickel steel, etc. After long discussion they agreed, therefore, with the Merchantmen's regulations to establish the range of rolled brass, etc., to extend it above and below the former limits, namely, instead of 60-70 to fix it from 52-72. As representative for these groups the alloys with 58, 60, 63, 67 and 72 copper were recommended. Later, eventually for an enlargement of the standard, there came into question Tombac with 95 per cent copper.

The extent of cast brass is likewise enlarged, namely, instead of 66 to 70 copper, as provided for in the Merchantmen's regulations, 57 to 71 copper, and as representative the alloys 60 to 40 (Muntz metal) and the alloy 67 to 53 indicate. They were, however, partly doubtful as to whether these alloys should still be accepted as standard, since such castings mostly could be replaced by the copper-poor alloys of special brass.

Relative to the indication and extent of special and refined brass the opinion prevailed to add to these special cast and rolled brass. Within the range of 55 to 59 copper, 42 to 38 zinc, as well as addition of tin, manganese, aluminum and iron, they were generally agreed to, but should still further additions be made? Nickel and magnesium (both of the latter for deoxidation purposes). Concerning the properties of these alloys Supervisor Schulz would submit further communications.

Relative to the designation Phosphor Bronze, the view was also general here to separate cast from rolled metal. Whether the range for the merchantmen's standard alloys given, viz., 89 Cu. 10 Sn. 1 Phosphor copper, with respect to the phosphorus content was to be enlarged and yet be admitted as a phosphor bronze with 3 to 4 per cent P. would be conferred about later. Supervising Engineer Wunder showed a dissertation of Moellendorf concerning standardization of bronze (Giesserei Zeitung, 1914, No. 1). Upon the proposal of Professor Heyn they agreed to this; instead of gun-metal and gun-metal gaskets, the expression machine-bronze relative to the zinc content was somewhat extended, namely, instead of 4 to 6 zinc in order to satisfy the needs of the marine and railroad service, 9 to 11 tin and 4 to 6 zinc were proposed. Privy Councillor Halfmann hoped that for gate-valves, slide-valves with high tin content alloys, 84 Cu., 15 Sn., 1 Zn. could be substituted. (Compare also proposal of R-Werft-Kiel for the introduction of a harder alloy 85-11-4 in contrast to the softer 87-9-4, by which also 85-9-6, the railroad alloy, could appear in the classification.) Relative to the range of designation bronze, the views were divided. Professor Bauer and Dr. Philippi proposed for the pure bronzes the designation tin-bronzes; in addition also Al, Mn, Fe, Zn and special bronzes. It was also insisted upon that already with regard to the valuation of their fabrications in foreign countries, as well also with respect to sculptor's necessities, the committee



incline to the expression of special bronzes and that it should be held as wide open as possible. It is still to be added that the expression "Gun-metal" in various districts of Germany are used with various meanings. Concerning the kind and extent of indications and designations as to the nomenclature Dr. Schulz and the standard committee should be heard. Dr. Philippi and Professor Bauer took under consideration these circumstances to make further proposals in their plans.

**Point 2 of the day's arrangements. Tolerance and degree of purity.** Dr. Doerinckel made the proposal concerning tolerances and degrees of purity in general with brass No. 1 Cu, with bronze No. 0.5, further along with both, likewise No. 0.5 Sn, respectfully, No. 0.5 Zn.

The proportion of purity relative to lead for cast brass amounts to 3 Pb with brass bolts or screws 58 to 42 to 2 Pb, with the use of the alloy 58 to 42 for other purposes up to 0.6 Pb; with the alloy 63-37 and 70-30 rolled, the amount of lead allowed corresponds to 0.3 Pb and 0.2 Pb; for special purposes, such as turbine blades, the amount of lead must be reduced to about 0.1 Pb, compared with bronze Pb=0.1.

The purity ratio relative to iron, in general, for 58-42 should be 0.4 Fe, and for 63-37 and 70-30 rolled as well as for bronze should not exceed 0.05 Fe. For most brass mixtures containing 0.3 Mn, Sn or Ni (up to 0.3) are harmless. On the other hand S, Se, Te are not authenticated, and As, Sb, Al, Mg and Si should be present only in traces. Dr. Doerinckel will urge his views as much as possible to also extend this further to the intermediate alloys of brass, etc. Professor Heyn shows that the range of impurities have been still less investigated and therefore a large number are to be surveyed with caution. From other considerations it was insisted upon that with the establishment of such figures one could not be too illiberal, which was the case with many, from beginning to end.

**Point 3. Ultimate tensile strength and other characteristic properties.** On the part of the Merchantmen's regulations in prospect, the figures of ultimate tensile strength were accepted, namely, for phosphor bronze, at least 20 Kg tensile stress, 12 per cent elongation; gun-metal, at least 20 Kg tensile stress, 10 per cent elongation; rolled brass at least 20 Kg tensile stress, 15 per cent elongation.

First of all it must be established that the relative value of the ultimate tensile strength should relate only to material heated to red heat (this demand seems to be unwarranted as applied to many non-ferrous alloys). These proposals are afterward to be revised; one must distinguish between values of ultimate tensile strength which are characteristic of the relative materials below the normal (favorable) and somewhat lesser values, which could be established on the basis of decreasing values and are so stated in the specifications as the lowest limits.

Relative to the other characteristic properties are the establishment of the density, the melting point; above all, however, that of the working properties was held to be desirable, and Dr. Doerinckel, Wunder, Dr. Busse and Dr. Philippi offered their valuable experience.

**Point 4. Range of Application.** The view whether the range of application was to be stated was divided; from this it could be only a question of the important example; the principle was the establishment of the characteristic properties of the alloys. The examples for the Merchantmen's standard are the following:

Phosphor—Bronze, 89-10-1 cast; flying pinion for centrifugal pumps; inserted pump cylinders and other thin-walled cast pieces, which should be resistant toward high pressures; hot and oil-driven armatures.

Gun-metal—86-10-4; valve cones and seats, steam-cock plugs, wedge valves, pump cases, cylinder covers. Bearings without white metal, outlets, cases for steam mains or with pressure or high-pressure armatures.

Cast Brass—Armature cases which must not be made from gun-metal.

Rolled Brass—Condenser tubes, turbine blades, small screws and cast parts.

Special Castings—Small shock bearings, stuffing-box collars, ground rings, fittings, windows.

Special Brass—Rolled; valve spindles, piston rods for pumps, boxes, screw couplings.

The representative of the brass firms will urge the extension of these tables.

At the second session other eminent metallurgists and foundry experts were present.

From the Merchantmen's Standard Commission intermediate stimulation came to hand and further statements concerning special properties and range of application of brass and bronze were brought forth.

The communication promised the president in the last session concerning manganese bronze was published in part in *Technik und Wirtschaft*, 1919, p. 437. For the establishment of the specifications and the standardizing of bronze a report came to hand from Dr. Philippi, Professor Bauer and Dr. Schulz, which, with that of the Moellendorf report, were to be consulted jointly.

Relative to special bronzes, especially marine bronzes, the report was of great value. In consequence of the discussion about the tolerances and degrees of purity, Dr. Doerinckel extended the report given at the last session. The office intends to publish these proposals as well as the one made by Supervising Engineer Wunder. They are to be placed side by side to afford a comparison of the characteristic properties of brass and bronze metal goods in the *Zeitschrift, Metall und Erz*, as well as in the Department Sheet, and the standard selections of the protocol session to date, so as to secure the interest of a wide circle of readers.

Further work of the session is in prospect with a report about copper from Dr. Nielsen, one about white metals and bearing metals, by Privy Councillor Halfmann and Mr. von Hanffstengel, concerning nickel and nickel alloys.

As to the question of distinguishing the copper alloys, Dr. Schulz furnished detailed explanations concerning his report; he urged the confirmation of the name "Tombac" and proposed 80 Cu as the lowest copper limit. Already the conception of brass from 72 to 73 Cu (blade and cartridge brass) was here set forth; the old designation of 65 Cu and upward for Tombac will not be recognized by the commission.

Towards the proposal of the introduction as to the designation by the terms "pressure" and "screw-brass" correspondence will be forbidden. Dr. Philippi in his report indicated the practice of Dr. Schulz that as bronze only copper alloys with at least 70 or 80 per cent Cu should be so designated. He could not therefore approve the designation of manganese bronze for a copper alloy with only 55 to 59 per cent Cu and recommended rather the indication of it as a Special Brass. On the other hand, according to his opinion, the expression "refined brass" should be permitted to lapse into disuse. The designations "New Bronze" and "Zinc Bronze" he urged to be dropped. He feared that in the latter case the reclamer of many so-called war bronzes, which for the most part contain zinc, would likewise be sensitive to authorization, and such persons would wish to employ these expressions.

On the other hand, Professor Bauer held that the designation bronze for the alloys in question at one time



had been established in foreign countries (namely, England and America), and further along he pointed out a prejudice of ours with respect to the expression "Special Bronze" as opposed to the practice of foreign lands; for this reason he feared to designate them as bronze, and because he held it to be illogical, accordingly, to introduce Al, Si, Pb, Mg, etc., into copper alloys and to make the one containing Zn an exception by calling it a bronze.

The representative of the Merchantmen's Standard Committee interceded for the designations "Special" and "Refined" brass, but held from other considerations that the proposed designation of manganese-zinc-bronze for the alloys 55-59 Cu was too lengthy.

Professor Heyn showed from this that in the existing question the Cu-Zn alloys (55-59 per cent) indeed in their properties have the bronze characteristic in reference to their ultimate tensile strength, that, however, on account of its high zinc proportion, it deserved something more than the designation of brass, and for it the name of "solid brass" might be taken into consideration.

Upon the report of Dr. Schulz, the president showed that the conclusively admissible indication of the alloys which appeared at first may be carried out when the rest of the standardization work for the alloys were further advanced. He therefore urged Professor Bauer and Dr. Philippi to draw up for various kinds of bronze a comparison of their properties and that this comparison be extended to their melting points and behavior toward chemical agents. This was to be a scheme similar to that applied to brass.

Director Hepner held it to be suitable for the standard sheet to contain the restricted alloys. When these values were exactly fixed the consumer could make out his orders more intelligently.

Upon the suggestion of the president, that for the marine alloys, 87 Cu, 9 Sn, 1 Zn (soft) and 85 Cu, 11 Sn,

4 Zn (hard), according to the proposal of Professor Heyn, the designation "Machine Bronze" be introduced and the term "Gun Metal" be reserved only for the same Cu, Sn, Zn alloys in which the zinc content is higher than the tin, Professor Heyn replied that such a separation would not be suitable and recommended either the term machine bronze or gun-metal for all these alloys.

Dr. Mueller wished to send word to Supervisor Engineer Wunder that the proposed figures for ultimate tensile strength in the tables be compulsory since in general they would be amply high.

The proposition concerning Sn-Cu-Zn alloys need not be taken up in the standard sheet according to the suggestion of Marine Director Schulz, since likewise the ample value in the retention of these alloys, such as the marine bronze, with the composition of 93 Cu and 1.5 Zn, was recently disproved. An extension of the table referred to the melting point, and the behavior toward chemical agents was held to be desirable. Likewise, in referring to the properties of wire, bare conduit wire could be included, and the proposal of Moellendorf (Giesereizeitung, 1914, No. 1) could be considered at the same time.

As to the question of aluminum, Director Borbeck's detailed explanations concerning his report were generally agreed to. Relative to the retention of zinc-aluminum alloys which, on account of their unfavorable properties (too small an elongation) had not been adopted, the views were somewhat conflicting; it was further suggested to take up a copper-tin alloy which the war had shown to be of service in pyrotechnic work. The president urged the extension of the report so as to afford a further opportunity to inquire about the properties of various aluminum alloys.

The vast number of alloys suggested and the advice concerning them should be invaluable to manufacturers and consumers of non-ferrous alloys.

## Secret Society Mechanics

A Little Homily on One of the Aggravations of the Shop Superintendent.

Written for The Metal Industry by WILLIAM H. PARRY

To rank outsiders or innocent bystanders who are unfortunate enough to be employed in a shop whose owners, superintendents, foremen, and about ninety per cent of the rank and file are members of the same lodge or order, I can extend my earnest sympathy.

To hear them address one another as "Brother" McGillicuddy or "Brother" Dinkelspiel while totally ignoring those outside of the pale, is a condition that is altogether too prevalent in many manufacturing plants. For a mechanic to hold his job by reason of his membership in certain secret orders is not to his credit or that of his superiors, and any shop where this practice is in vogue can be classified as being among the dead ones.

To achieve real greatness among this gentry, one must be or at least have passed through the various "chairs" of the orders such as "High Priest of the Order of the Bunk" or "The Exalted Outside Doorkeeper of the Ancient and Honorable Society of the Stung." The many whispered conferences during shop hours, between these "holier than thou" plutocrats destroy shop morale, decrease production and engender a spirit of resentment on the part of the shop force who are holding their jobs on merit alone.

Even at the "Get Together" meetings of the shop executives and men, this herding by themselves is in evidence, and if it be that there are members of three or four secret orders in attendance, it means three or four herds plus the rank outsiders, who, while they may not

herd for the love of this peculiar form of indoor sport, are compelled to do so, as the "joiners" will not mix.

Some shop executives who have experienced serious trouble by having too many of one kind of these animals in their plants, have contrived to weed out the most flagrant of the transgressors, and replace them with members of orders antagonistic to their doctrines, only to find that in the long run their troubles were multiplied as many times as there were "societies." When a shop executive is so small minded as to permit any of his force to hold his job because he can orate fervently at the funeral services of a fellow lodge member (that was) there is room for improvement in that department. When a mechanic applies for work as such, my advice to him is to leave his buttons, pins, watch chain, charms, or whatever insignia of his order or orders he may wear, at home, or better still pledge them with his "Uncle."

What is more disgusting than to meet a male being masquerading as a he-man profusely decorated with a lot of bullfrogs' teeth, mules' horns, elephants' tail feathers, and such junk? Secret mutual admiration societies may have their uses, and far be it from me to hand them a knock, BUT, the members of them all are a pretty poor lot of fish, taken as a whole, exceedingly vain, fond of display, splendid tool and money borrowers, poor payers, great "mischanics" and wholeheartedly opposed to the Eighteenth Amendment, and the enforcement of the Volstead Act.

## Metal Plating

### Part 7. Cadmium Plating. A Tabulation Showing the Time Required to Deposit a Given Thickness of Cadmium with Different Values of Current Density. A Few Remarks About the Properties and Deposition of Cadmium from Aqueous Solutions Are Also Given<sup>1</sup>

Written for The Metal Industry by W. G. KNOX, Associated with the Chemical Laboratory of the Western Electric Company, Inc.

#### PROPERTIES

Cadmium is a white metal with a slight bluish cast. It will take a high polish, is soft enough to leave a metallic streak when drawn across paper, a property somewhat similar to that which lead produces. It is capable of being drawn into wire or rolled into thin sheets. This must be done at comparatively low temperatures. At 80° C. or thereabouts, the metal becomes brittle and can be readily reduced to a powder. The melting point of cadmium is approximately 322° C. which is appreciably lower than that of zinc (419° C.). Cadmium is found in nature largely associated with zinc.

Like zinc it can be readily plated from an aqueous solution of its salts. It is a divalent metal which means that the amount of electricity necessary to deposit a given weight is twice as much as if the valence were only one.

#### CADMIUM PLATING AS A PROTECTION FOR IRON AND STEEL

The degree of protection afforded by any metal plated over another is influenced by the position of the two metals to each other in the electromotive series. Thus, zinc offers very good protection to iron because it is distinctly above iron in the electromotive series.

Various and frequently checked measurements of cadmium against other elements have shown that its position in the electromotive series probably is just below iron. However, some text books place it just above iron in which position it should theoretically serve as a more useful protective agent for the latter against corrosion. As a matter of fact tests which have been made on iron or steel articles coated electrolytically with cadmium have shown it to be a very good preventive of rust. Blassett (THE METAL INDUSTRY, p. 509, Sept., 1911) found that it was more rust-proof than nickel or tin and was equal to an electro deposited zinc plate.

R. C. Rudd working under the direction of Prof. F. C. Mathers reported some very favorable results with cadmium coated iron. His tests showed that strips of sheet iron electroplated with cadmium compared very favorably with similar strips coated with zinc when they were exposed to the weather. This test would seem to indicate that the position of cadmium in the electromotive series was above rather than below iron.

#### CADMIUM PLATING SOLUTIONS

As a result of numerous tests carried out in 1914 by Prof. F. C. Mathers several types of plating solutions have been found to be satisfactory for electro-deposition of cadmium. A few of these solutions are mentioned here as they may prove of interest to those who may be trying or who expect to try out the value of electro-deposited coatings of cadmium for decorative or protective purposes.

These solutions are:

- (a) The sulphate
- (b) The perchlorate
- (c) The fluoride
- (d) The fluo-silicate
- (e) The fluo-borate
- (f) The cyanide

The approximate composition of four of these electrolytes is given herewith.

- (b) Perchlorate:\*  
8 grams of cadmium as perchlorate  
7% free perchloric acid  
.2 gram peptone  
200 c.c. water
- (c) Fluoride:  
4% cadmium as fluoride  
15% free hydrofluoric acid  
.2 gram glue
- (e) Fluoborate:  
4% cadmium as fluoborate  
1.—6.5% free fluoboric acid  
.2 gram peptone
- (f) Cyanide:  
8 grams cadmium as potassium cadmium cyanide  
1.—18 grams potassium cyanide  
200 c.c. water

These solutions may be operated at current densities varying from 5 to 20 amperes per square foot of plating surface without fear of burning the deposit. In some cases the densities may be increased still further by warming the solution. Prof. Mathers in reporting his tests showed that these solutions were capable of giving good thick deposits. With careful regulation he was able to obtain these thick dense deposits with a beautiful bluish white color.

If they could be developed in this manner it should be quite easy to electroplate cadmium with coatings as thick as those usually formed from nickel, copper or zinc solutions and of equal smoothness or beauty.

#### CONSIDERATIONS AFFECTING THE COMMERCIAL USE OF CADMIUM

Because of the lower temperature of volatilization it may be largely separated from zinc in the roasting process. It may be further purified by fractional distillation.

About the only reason which can be offered for the small extent to which cadmium is used in electroplating is the high price which is charged for the metal. The most recent quotations show the figures to be comparable to those of 1914 or 1915—\$1.50 or more per pound as compared with zinc at .08 to .10 cents per pound. If quotations of the two metals ever get close to each other we can expect to see a rapid rise in the use of cadmium as a decorative finish or as protective coating for iron or steel.

The table shown herewith indicates the time required to deposit thickness of cadmium varying from .0001" to .002" at current densities of one (1) to fifty (50) amperes per square foot assuming the current efficiencies to be 100 per cent. The table is equally applicable to plating or refining. With care the cathode efficiencies can be maintained at a fairly high rate so that the normal addition of 10 per cent to the figures listed in this table, which has been proposed for several of those previously published, will be satisfactory for cadmium.

\*Perchloric acid is rather expensive as a result of which a plating solution made up with this formula would be prohibitive except possibly on a laboratory scale.

<sup>1</sup> For parts 1, 2, 3, 4, 5 and 6, see THE METAL INDUSTRY for June, 1919, August, 1919, January, April, June and August, 1920.



TIME REQUIRED FOR A THICKNESS IN INCHES OF CADMIUM.  
CALCULATED ON THE BASIS OF 100% CATHODE EFFICIENCY

HOURS MINUTES AND SECONDS

CURRENT DENSITY

GRAMS PER SQUARE INCH	0.0001	0.0002	0.0003	0.0004	0.0005	0.0006	0.0007	0.0008	0.0009	0.001	0.002
1	.05 <sup>45</sup>	.12 <sup>30</sup>	.18 <sup>15</sup>	.23 <sup>00</sup>	.29 <sup>45</sup>	.35 <sup>30</sup>	.41 <sup>15</sup>	.46 <sup>00</sup>	.52 <sup>45</sup>	.58 <sup>30</sup>	.64 <sup>15</sup>
2	.02 <sup>23</sup>	.05 <sup>15</sup>	.08 <sup>07</sup>	.12 <sup>00</sup>	.15 <sup>45</sup>	.18 <sup>30</sup>	.22 <sup>15</sup>	.23 <sup>00</sup>	.26 <sup>45</sup>	.29 <sup>30</sup>	.32 <sup>15</sup>
3	.01 <sup>55</sup>	.03 <sup>10</sup>	.05 <sup>05</sup>	.07 <sup>00</sup>	.09 <sup>45</sup>	.12 <sup>30</sup>	.14 <sup>15</sup>	.16 <sup>00</sup>	.17 <sup>45</sup>	.18 <sup>30</sup>	.20 <sup>15</sup>
4	.01 <sup>35</sup>	.02 <sup>10</sup>	.04 <sup>05</sup>	.05 <sup>00</sup>	.07 <sup>45</sup>	.08 <sup>30</sup>	.09 <sup>15</sup>	.11 <sup>00</sup>	.13 <sup>45</sup>	.14 <sup>30</sup>	.16 <sup>15</sup>
5	.01 <sup>25</sup>	.02 <sup>05</sup>	.03 <sup>00</sup>	.04 <sup>00</sup>	.05 <sup>45</sup>	.06 <sup>30</sup>	.08 <sup>15</sup>	.09 <sup>00</sup>	.10 <sup>45</sup>	.12 <sup>30</sup>	.14 <sup>15</sup>
6	.01 <sup>15</sup>	.02 <sup>00</sup>	.02 <sup>45</sup>	.03 <sup>30</sup>	.04 <sup>15</sup>	.05 <sup>00</sup>	.06 <sup>45</sup>	.07 <sup>30</sup>	.08 <sup>15</sup>	.09 <sup>00</sup>	.10 <sup>45</sup>
7	.01 <sup>05</sup>	.01 <sup>45</sup>	.02 <sup>30</sup>	.03 <sup>15</sup>	.04 <sup>00</sup>	.04 <sup>45</sup>	.05 <sup>30</sup>	.06 <sup>15</sup>	.07 <sup>00</sup>	.08 <sup>45</sup>	.10 <sup>30</sup>
8	.00 <sup>55</sup>	.01 <sup>35</sup>	.02 <sup>20</sup>	.03 <sup>05</sup>	.03 <sup>50</sup>	.04 <sup>35</sup>	.05 <sup>20</sup>	.06 <sup>05</sup>	.06 <sup>50</sup>	.07 <sup>35</sup>	.08 <sup>20</sup>
9	.00 <sup>45</sup>	.01 <sup>25</sup>	.02 <sup>10</sup>	.02 <sup>55</sup>	.03 <sup>40</sup>	.04 <sup>25</sup>	.05 <sup>10</sup>	.05 <sup>55</sup>	.06 <sup>40</sup>	.07 <sup>25</sup>	.08 <sup>10</sup>
10	.00 <sup>35</sup>	.01 <sup>15</sup>	.02 <sup>00</sup>	.02 <sup>45</sup>	.03 <sup>30</sup>	.04 <sup>15</sup>	.05 <sup>00</sup>	.05 <sup>45</sup>	.06 <sup>30</sup>	.07 <sup>15</sup>	.08 <sup>00</sup>
15	.00 <sup>25</sup>	.00 <sup>05</sup>	.01 <sup>50</sup>	.02 <sup>35</sup>	.03 <sup>20</sup>	.04 <sup>05</sup>	.04 <sup>50</sup>	.05 <sup>35</sup>	.06 <sup>20</sup>	.07 <sup>05</sup>	.07 <sup>50</sup>
20	.00 <sup>15</sup>	.00 <sup>00</sup>	.01 <sup>40</sup>	.02 <sup>25</sup>	.03 <sup>10</sup>	.03 <sup>55</sup>	.04 <sup>40</sup>	.05 <sup>25</sup>	.06 <sup>10</sup>	.06 <sup>55</sup>	.07 <sup>40</sup>
25	.00 <sup>05</sup>	.00 <sup>00</sup>	.01 <sup>30</sup>	.02 <sup>15</sup>	.03 <sup>00</sup>	.03 <sup>45</sup>	.04 <sup>30</sup>	.05 <sup>15</sup>	.06 <sup>00</sup>	.06 <sup>45</sup>	.07 <sup>30</sup>
30	.00 <sup>00</sup>	.00 <sup>00</sup>	.01 <sup>20</sup>	.02 <sup>05</sup>	.02 <sup>50</sup>	.03 <sup>35</sup>	.04 <sup>20</sup>	.05 <sup>05</sup>	.05 <sup>50</sup>	.06 <sup>35</sup>	.07 <sup>20</sup>
35	.00 <sup>00</sup>	.00 <sup>00</sup>	.01 <sup>10</sup>	.01 <sup>55</sup>	.02 <sup>40</sup>	.03 <sup>25</sup>	.04 <sup>10</sup>	.04 <sup>55</sup>	.05 <sup>40</sup>	.06 <sup>25</sup>	.07 <sup>10</sup>
40	.00 <sup>00</sup>	.00 <sup>00</sup>	.01 <sup>00</sup>	.01 <sup>45</sup>	.02 <sup>30</sup>	.03 <sup>15</sup>	.04 <sup>00</sup>	.04 <sup>45</sup>	.05 <sup>30</sup>	.06 <sup>15</sup>	.07 <sup>00</sup>
45	.00 <sup>00</sup>	.00 <sup>00</sup>	.01 <sup>00</sup>	.01 <sup>40</sup>	.02 <sup>25</sup>	.03 <sup>10</sup>	.03 <sup>55</sup>	.04 <sup>40</sup>	.05 <sup>25</sup>	.06 <sup>10</sup>	.06 <sup>55</sup>
50	.00 <sup>00</sup>	.00 <sup>00</sup>	.01 <sup>00</sup>	.01 <sup>35</sup>	.02 <sup>20</sup>	.03 <sup>05</sup>	.03 <sup>50</sup>	.04 <sup>35</sup>	.05 <sup>20</sup>	.06 <sup>05</sup>	.06 <sup>50</sup>
GRAMS PER SQUARE INCH	.0014	.0028	.0042	.0056	.0070	.0085	.0099	.0113	.0127	.0141	.0282

ATOMIC WEIGHT OF CADMIUM.-----112.4  
SPECIFIC GRAVITY OF CADMIUM.-----8.60  
ELECTRO-CHEMICAL EQUIVALENT OF CADMIUM.-----0.00582

NOTE - TIME BELOW 11 MINUTES GIVEN IN MINUTES  
AND SECONDS; 11 MINUTES AND ABOVE,  
GIVEN IN HOURS AND MINUTES.

W6K

TABLE SHOWING RATE OF DEPOSITION OF CADMIUM

# Tin Plating from Alkaline Tin Baths by the Use of Addition Agents

A Paper Presented at the Thirty-eighth General Meeting of the American Electrochemical Society Held in Cleveland, September 30 to October 2, 1920.

By FRANK C. MATHERS<sup>1</sup> and WILLIAM H. BELL<sup>2</sup>

## TESTS OF ADDITION AGENTS.

The preliminary work consisted in the testing of the various addition agents. Each test bath had a volume of 500 c.c. (1.1 pint). The composition was 6 per cent. (8 oz. per gal.) of crystallized stannous chloride and 6 per cent. (8 oz. per gal.) of sodium hydroxide. Two cast tin anodes, 3.7 cm. sq. (1.5 in.), were suspended with iron wires on opposite sides of a beaker. An iron cathode, freshly cleaned in acid, was suspended between the anodes. The current density was 0.5 amp. per sq. dec. (4.7 amp. per sq. ft.); the temperature 50° C. (122° F.). In each case 0.1 per cent. (0.13 oz. per gal.) of the addition agent was added. The increase in the addition agent above this amount was not found to appreciably improve the deposit. The solid addition agents were added directly to the warm baths in most cases. If the addition agent did not dissolve well, alcoholic solutions were used.

The results with the addition agents were as follows:

**Sandarac:** Smoother and less crystalline than with no addition agent.

**Rosin:** Smooth and adherent, but a little crystalline on the edges.

**Glue:** Excellent deposit. However, the glue was rapidly changed by the hot alkali, and the products formed caused poor deposits. Further additions of the glue were then of no value. Glue would have been a satisfactory addition agent if it did not decompose.

**Oleic acid:** Smooth, adherent deposit, but with a tendency to become crystalline on the edges. Previous sulphonation of the oleic acid somewhat improved the deposit.

**Gum tragacanth:** Smooth, slightly crystalline.

**Manna:** Smooth, slightly crystalline.

**Aloin:** Non-adherent and crystalline.

**Sodium sulphide, or sulphur, or sodium sulphide and rosin:** Crystalline and non-adherent.

**Balsam copaiba:** Smooth, adherent deposit.

The balsam copaiba was the most satisfactory of any, and rosin probably ranked next. These substances produced deposits that were sufficiently adherent, smooth and non-crystalline for commercial use.

## DETERIORATION OF THE BATH.

The balsam copaiba or rosin gave good deposits in new baths, but after a time spongy deposits were obtained.<sup>3</sup> The use of new portions of addition agent did not overcome the trouble. The addition of more sodium stannite corrected the trouble, thus showing that the concentration of stannous salt had decreased. This could have been caused either by the oxidation of the stannous salt or by low anode corrosion. Tests with a coulometer in series with the baths showed that only 76 to 78 per cent. of the theoretical quantity of tin dissolved from anodes made of ordinary commercial tin. A black, hard film formed on the anodes. The addition of 1

percent sodium cyanide to the bath lowered the corrosion of the anode to 55 per cent. The addition of sodium chloride or sodium sulphate had no effect on the corrosion. This anode trouble was corrected by using amalgamated anodes made from electrolytically refined tin; three different baths showed anode corrosion efficiencies of 101.5, 102 and 101.6 per cent. respectively. However, the lives of the baths were not materially greater with the pure than with the impure anodes. This showed that the oxidation of the stannous salt must be the main source of the trouble. Analytical determinations of the stannous salt in some baths which were being run for 8 to 10 hours in each 24 hours showed the following percentages of tin:

Time	Anodes	Anodes
	Amalgamated, Refined Tin	Commercial Tin
At start	2.59	2.57
25 hours	2.07	1.82
99 hours	0.11	0.11

In one experiment the addition of 1 per cent. sodium cyanide somewhat slowed down this oxidation of the stannous salt, which had dropped to 0.23 only after 216 hours. A bath without addition agent or electrolysis or heating showed a similar decrease in stannous salt, only the rate was slower.

Glycerine, milk sugar, cane sugar and alcohol were added to separate baths with the idea that they might prevent the oxidation in the way that they protect sulphites from oxidation. However, they showed no beneficial action, and, moreover, hindered the action of the addition agent. Electrolysis of the baths with small iron cathodes did not aid in regeneration nor did boiling the baths with sulphites. No variation in concentration or composition prevented the deterioration.

## SUMMARY.

1. Balsam copaiba, rosin, and, to a lesser extent, other similar organic fatty acids or acid-containing substances were found to be successful addition agents in producing smooth, adherent deposits of tin from sodium stannite baths.

2. The composition of the baths was 6 per cent (8 oz. per gal.) of crystallized stannous chloride, 6 per cent. (8 oz. per gal.) sodium hydroxide and 0.1 per cent. (0.13 oz. per gal.) of the addition agent. A current of 0.5 amp. per sq. dec. (4.7 amp. per sq. ft.) and a temperature of 75° to 90° C. (167° to 194° F.) were used.<sup>4</sup>

3. These experiments were unsuccessful in that sodium stannite baths gradually oxidized or deteriorated to such an extent that continued satisfactory deposits could not be obtained. No method of regenerating the baths was found.

4. The use of sodium cyanide in these baths, as is frequently recommended, was of no advantage.

5. This bath is not recommended for tin plating, on account of this deterioration. It would be unreasonable to bother with this sodium stannite bath when one can use the stannous sulphate bath, which gives splendid deposits without any important difficulties.

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<sup>2</sup> Sec'y-Treas., National Stain and Reagent Co., Norwood, Ohio.

<sup>3</sup> U. S. Patent 921,943.

<sup>4</sup> Per cent as used in this paper means grams per 100 c.c. of bath.

<sup>5</sup> The rest of the experiments were run at 75° to 90° C. (167° to 194° F.), because the higher temperatures gave deposits that were much superior to those obtained at 50° C.



## Experimental Electroplating

A Description of the Methods and Apparatus Employed in Plating for Laboratory Purposes, for the Inexperienced, or Amateur Worker

Written for The Metal Industry by F. H. SWEET

### GENERAL PRINCIPLES.

The average inexperienced experimenter seems inclined to regard electro-plating as a very complicated and difficult process involving the use of costly materials and apparatus. This is not the case, however, as the successful electro-deposition of copper, nickel or silver is a comparatively simple process, the practice of which easily comes within the resources and ability of the amateur. An electro-plating outfit should be included in the equipment of every workshop, and it is the purpose of this article to help the mechanic properly to plate and finish his machine or parts.

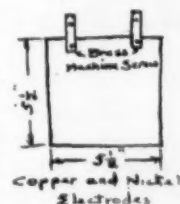
While it is not the purpose to give a lengthy treatise on the theory of electro-deposition, a brief outline of the fundamental principles involved will be given, as an elementary understanding of the theory of any process or operation about to be performed invariably proves helpful and advantageous in actual practice.

Pure water is a very poor conductor of the electric current, but if a small quantity of table salt (sodium chloride) is dissolved in it, it at once becomes a comparatively good conductor of electricity, and in this state is technically known as an electrolyte. If we immerse two electrodes in such a solution and pass a current between them it will tend to decompose the table salt into its constituent elements, sodium and chlorine. The atoms of sodium will accumulate at the negative electrode or cathode and the chlorine will be attracted by the positive electrode or anode.

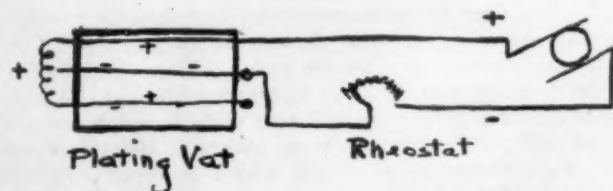
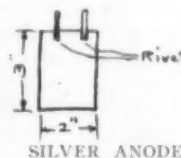
This is exactly what happens in the process of electro-plating. For an illustration, we will assume that we are plating with nickel. In place of the sodium chloride, nickel-ammonium sulphate would be dissolved in the water, and upon passing an electric current through such a solution we find that the negative electrode would soon become covered with a thin deposit of metallic nickel, owing to the decomposing action of the current. If we take the negative electrode out and substitute it with articles to be plated we will find that the articles will undergo the same process and a deposit of nickel will form on them. If we wish to plate with copper, copper

square and 10 inches deep. A glass storage battery jar of the proper size is very suitable. The top of the vat should be equipped with three 5/32 inch brass rods. One end of each rod should be threaded to receive 8/32 machine nuts. Two of the rods are to be used to hold the electrodes, and the articles to be plated are suspended from the third one. On account of the necessity of varying the distance between the electrodes for different classes of work, it will not be found desirable to construct a permanent arrangement to hold the rods in place, as they are heavy enough, when equipped with the electrodes, to remain in any position they are placed in.

The electrodes of a plating vat should be of the same metal that is to be deposited. Thus, if we desire to copper plate, copper electrodes should be used; if we wish to nickel plate, nickel electrodes should be used, etc. For this reason it will be found necessary to construct three sets of electrodes for use with the vat; one set of copper, one of nickel, and one of silver. Owing to the greater expense of silver, the electrodes of this metal are made much smaller than those of



nickel and copper, and on this account it will be found necessary to plate one article at a time when depositing silver. As the silver plating solution is equally expensive, the amount prepared should equal only one-third that of the copper or nickel solutions, and the silver electrodes should be suspended into the solution by means of longer strips than those used on the other electrodes so they will be completely immersed. The dimensions of the various electrodes and the method of suspending them from the brass rods are shown in the diagrams.



SKETCH OF APPARATUS ARRANGEMENT

sulphate should be substituted for the nickel-ammonium sulphate, etc.

In many cases, where there are but a few small articles to be electro-plated, a small vat may be used with entire success, and the results will be found to be just as good as those attainable by means of larger vats and more costly apparatus. For general workshop use, the outfit described here will be found both practical and serviceable.

### APPARATUS USED.

The vat proper should be a square earthenware or glass jar, with dimensions not smaller than 8 inches

While three Bunsen cells connected in series will be found to produce sufficient current to operate successfully the vat described, the use of a small 8 ampere, 10 volt dynamo of the shunt-wound variety is to be recommended on account of the steady and unvarying current it is capable of generating. It is utterly impossible to use dry cells, as they polarize too rapidly for work of this nature. A small rheostat should be included in the outfit, as it is often necessary that the current be properly proportioned for the work required of it.

Successful electro-plating depends, to a great extent, upon the chemical purity of the solutions used, and only the purest substances should be used in their preparation. If it is impossible to obtain pure distilled water, the next best substitute is rain water.

First make a saturated solution of copper sulphate blue vitrol, by dissolving the crystals in a gallon of pure water until it is found that the crystals will no longer dissolve. The solution is then said to be "saturated." To this preparation add about half a cup of chemically pure sulphuric acid, care being taken that the acid is poured in a small, gentle stream. After filtering, through blotting paper, the solution is ready to be used or stored away in flasks until it is desired to use it.

For nickel-plating, dissolve one pound of nickel-ammonium sulphate in one gallon of water. To this add

about 2 tablespoonfuls of pure sulphuric acid. The preparation is then filtered, after which it is ready to use. After this solution is used for some time as a bath, it is advisable to test it with litmus paper to ascertain whether it is acid or alkaline, as there is a tendency for ammonia ( $\text{NH}_4\text{OH}$ ) to form, which renders the bath alkaline. In this case, sulphuric acid should again be added until the bath is just acid.

For silver-plating, obtain two ounces of silver nitrate from a chemical supply house and dissolve it in two quarts of pure warm water. To this add a solution of cyanide of potassium (a poison), which will cause the silver to precipitate as crystals of cyanide. Immediately discontinue adding the potassium cyanide after it is found that all the silver has precipitated. The whole solution is then filtered through blotting paper to recover the crystals of silver cyanide formed. The filtrate may then be discarded, as it is of no further use. Now place the silver cyanide crystals in a vessel containing about one and one-half quarts of pure water, and to this add potassium cyanide, stirring the solution at the same time until all the silver cyanide crystals have dissolved. We then have a solution of the double cyanide of silver which is used in silver plating. The solution may be kept in a clean, stoppered bottle until it is used.

#### PREPARATION OF ARTICLES.

One of the most important operations in the process of electro-plating is that of properly preparing the surface of the articles to receive the deposit. The smallest speck of foreign matter upon the surface of the article to be plated is sufficient to cause the deposit to peel off. Many times the mere touching of the surface with the fingers so contaminates the object that it becomes impossible to electro-plate it successfully without again putting it through the cleansing process.

It is, of course, understood that the surfaces of the article to be plated should first be rendered sufficiently smooth by a mechanical process, if it is not already so. In the case of the amateur, this can usually be accomplished by polishing the surface with fine emery cloth.

After the surface is mechanically prepared, it then becomes necessary to render it chemically clean before it is immersed in the plating bath. As it is impossible to prepare one cleansing or pickling bath that will be suited for all metals, it will be found necessary to mix several different pickles; one for each different metal.

Before the articles are immersed in the pickle, they should be dipped in clean water, and after they are brought out of the pickle they should again be thoroughly rinsed in clean, running water before they are finally placed in the plating bath. The articles should be dipped in the pickle by means of a copper wire.

Pickle for copper, brass and German silver should be 100 parts of sulphuric acid, 50 parts of nitric acid and 1 part of table salt. Permit the preparation to stand one day before using. Pickle for zinc is 100 parts of pure water, and 10 parts of sulphuric acid. For iron and steel, pickle should be 1 part sulphuric acid, 15 parts water and  $\frac{1}{2}$  part nitric acid. It is advisable to add a few pieces of zinc to such a solution.

When using the acid dips, especially in the case of copper and brass, care should be taken that the metal is not left too long in the pickle, as the acids act quickly and will pit the surface if permitted to act long enough. The proper method is to dip the articles in water and then in the pickle alternately.

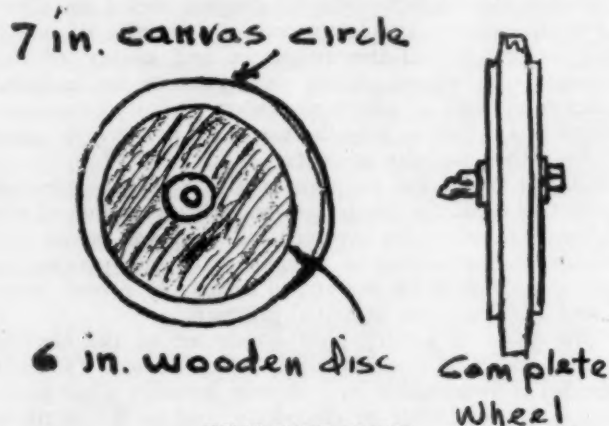
If it is desired to plate a brass article that already has a fine polish upon its surface, the acid cleansing bath should not be used, because of its tendency to destroy the polish. A dip composed of one part of potassium

cyanide to 10 parts of water can be substituted for the acid dip in this case. It will be found necessary to leave the brass much longer in this than in the acid pickle.

#### GENERAL SUGGESTIONS

When plating objects that have large projections, the electrodes of the vat should be placed as far apart as possible, otherwise an unequal deposit will result, owing to the great current density at the projections where the resistance of the bath is least.

In electro-plating, care should be taken that the deposit does not form too rapidly, as plating of this nature invariably proves to have poor adhesive qualities and soon

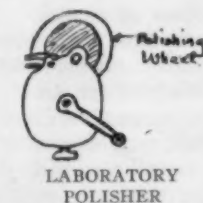


HOME MADE WHEEL

peels off. Equally wrong is the practice of permitting the deposit to form too slowly. The current should be regulated by means of the rheostat, until the deposit formed is flesh-pink in the case of copper, and milky white in the case of silver and nickel. If the current is

not of the proper proportion, the deposit has a noticeable tendency to become dark in color.

If the plating solutions are not in use, they should be kept in stoppered vessels, otherwise they will become contaminated with foreign matter from the atmosphere.



The articles should be dipped in the pickle on a copper wire, bent in the form of a hook, and immediately after cleaning, the articles should be placed in the plating vat by hanging the copper wire or hook on the central brass rod.

The fact that the amount of current passing through the bath is dependent upon the proximity and size of the electrodes should be kept in mind. If a single small article is being plated, it is necessary to move the electrodes closer together in order to reduce resistance and permit sufficient current to pass, owing to the small surface of the negative electrode which is formed by the article receiving the plating.

After the articles are taken from the plating vat, they should be washed in hot water and dried in a box of sawdust. They are then ready to receive the final polishing, which may be done on a small grinding head equipped with a buffing wheel. If the mechanic is not fortunate enough to have one of these in his workshop equipment, a good substitute will be found in a bench grinder, which may be fitted with a polishing wheel. The polishing wheel is made by cutting out about twenty 7-inch circles from thin canvas and clamping them between two wooden discs, as shown. The purpose of the wooden discs is to hold the canvas circles in place under the pressure of polishing.



## EDITORIAL

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## THE METAL INDUSTRY

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## OLD VERSUS NEW

All new inventions are heralded with a flourish, provided, of course, they are really inventions and really work. The revolutionary effect of electric furnaces in brass and aluminum industries, is simply one case in point. Nevertheless, it seems that the old and tried methods are difficult to displace. There is something very safe and satisfactory about the system which we have known for many years, and which we understand so thoroughly. No matter how many have changed, no matter what inroads a new product has made, the old system will still find its adherents and believers.

In this issue we publish a description of the West Virginia Metal Products Corporation plant in which not a single pit-fire is to be found. On the other hand, we have the opinion expressed in the article on Casting Shop Costs, also in this issue, that many of the objections to crucibles can be overcome by careful and skilled handling. Obviously, Caster who writes this article still favors crucibles. It is easy, of course, to sneer and say he is out of date. Very possibly this is true. Electric furnaces have without doubt, revolutionized one industry, namely, the brass and copper rolling mills. Foundries, however, have resisted them to a considerably greater extent.

There seems to be no doubt that crucible melting practice offers room for much improvement. The point made in Casting Shop Costs is that much of the present dissatisfaction with their use is due to misuse. The design of furnaces, draft, brickwork, stack height, and diameter, flue sizes, and height of the grate above the bottom of the ash-pit are as often as not, wrong. Add to this the admitted severity of the work, the peculiar type of labor which plays such a large part in the trade and the skill required to handle crucibles properly and one has a list of obstacles which would overcome almost any other system. Nevertheless, crucibles have been with us, a tried and, as regards their product, a satisfactory tool.

On the other hand, open flame furnace and electric furnace adherents claim that these difficulties are too numerous, and that some of them are inherent in crucibles, and therefore, cannot be overcome, thus making them undesirable even at their best.

It is an interesting situation compared with that which the crucibles had to face fifteen to twenty years ago. At that time, they were used in both rolling mills and foundries. When the oil and gas fired open flame furnace appeared, it was thought that crucibles were doomed, but they were left untouched in the rolling mill, while in the foundry, they divided the work. Now an attack from the electric furnace has, it can be safely said, changed the whole operation of the above mentioned brass and copper rolling mills. Are the foundries also headed in the same direction? We shall be very glad to have an expression of opinion from our readers.

### GOVERNMENT SERVICE

An examination has been announced by the U. S. Civil Service Commission for a foundry helper. The position is in the Bureau of Standards and calls for a man who has had practical foundry experience and is qualified in the making of cores and the molding of brass and iron. He must understand brass furnace operations including the mixing, melting and casting of non-ferrous metals. He must also understand cupola charging and be able to run a cupola for cast iron. It is stated also that some experience in simple machine shop manipulations, is desirable. The training and experience of the man must cover a period of at least two years and upon this 60 per cent of the examination is figured.

These are, undoubtedly, very high requirements. The short length of time for training given means little because it is doubtful whether anyone could acquire all the experience demanded within two years. A man of this type would be most valuable to any brass or iron foundry where he would more likely be found as a foreman than anywhere else. To be sure the Government demands and gets much more highly trained men than the shops. Nevertheless, a glance at the salary—\$720.00 to \$1,080 per year, with a possible increase of \$20 a month, shows something of a discrepancy between the payment offered and the experience demanded. How much could a foundryman so qualified command in the open market?

### HANDLING CHEMICALS

A certain number of accidents is and probably always will be inevitable wherever chemicals are made and used. Nevertheless, there must be the constant effort on the part of manufacturers and users to keep down this number to the irreducible minimum. The only accidents which should be permitted to occur are those which can be honestly classed as unavoidable. A large number of those which happen at present cannot be excused in this fashion. They are due in part to carelessness and in part to ignorance. Carelessness, strangely enough, is often the result of long acquaintance with those materials and a certain contempt, which comes from having escaped injury for a long time. Even the memory of a previous accident fades. Ignorance, however, is self-explanatory. The person unused to sulphuric acid, may very easily when told to dilute it, pour water directly into the concentrated acid. Needless to say, one such

experience enlightens him, but it is a poor method of gaining an education.

Both for safety's sake and for the sake of the steady operation of a plant or shop, there should be constant reminders for those who should know of the dangers among which they work, and clearly phrased directions, followed up by careful watching for those who are ignorant. Large clear signs, printed in the various languages of the men who are employed are a necessity where work of this kind is done. Plating shops using cyanides, strong acids and alkalis should impress on the men not once, but constantly, that cyanide is a deadly poison, either to breathe or to get into sores or open cuts. Hydrofluoric acid is one of the most corrosive substances known, attacking even glass. The dilution of sulphuric acid should be effected by pouring the acid very slowly into water. Hydrochloric acid gas is one of the strongest and most dangerous irritants to the lungs. Concentrated nitric acid gives the brown  $\text{NO}_2$  fumes, which are very corrosive and dangerous. Strong alkalis should be handled with extreme care, especially if there are any open cuts to be protected.

### JOSEPH H. BAIRD

In the issue of April, 1919, of THE METAL INDUSTRY, an account was given of Joseph H. Baird, a Connecticut nonagenarian, who after eighty years as an inventor and builder still attended to business. On November 14, 1920, he passed away, and the machine industry lost one of its most prominent and picturesque figures. Mr. Baird was president of the Baird Machine Company up to 1913. When he was eighty-six years old he resigned, retiring at his own request in favor of a younger man, but still continuing to act as adviser to the concern.

Mr. Baird was an inventor and builder of great prominence in New England from the time he was twenty years old. His fame lasted through two generations and it is strange now to think that he was among the best known in his field fifty years ago.

Very few of the present generation of machine builders knew him except, of course, by reputation. As a builder and inventor, his name is written indelibly in the history of automatic machines for making small products in large quantities. Perhaps the most attractive thing about his career is the side which is brought to light by his favorite remark, "Well, I don't care if I did lose money, I made the dern thing work." He was an inventor and builder by inclination and a business man by necessity. The machine building industry has suffered a notable loss.

### NEW BOOKS

"Lead," by J. A. Smythe, Ph.D., D.Sc. Published by Isaac Pitman & Sons, 2 W. 45th Street, New York City., size 4 3/4" x 7". Price, payable in advance, \$1.00. For sale by THE METAL INDUSTRY.

This is another of the Pitman series on Common Commodities and Industries. The aim in writing this book, as the author states in his preface, is "to present a straightforward account of the subject free from technicalities, and to set forth in details the various processes used from the time the ore is dug out of the earth until the pure metal and the valuable pigments derived from it, are put on the market." It is a condensed, simply written and very readable summary of the present knowledge of lead. Chapters of interest to the metal trades are as follows: Smelting in the reverberatory furnaces. Softening and de-silverization of work lead. Properties and uses of lead and its alloys. Compounds of lead—litharge and red lead. White lead and other lead pigments. Lead in medicine and lead poisoning.

The book, although written so that the layman can understand, is useful also for the technical man because of its condensed form, and the interesting drawings and sketches, and its scientific accuracy.

"Gold," by Benjamin White. Published by Isaac Pitman & Sons, 2 W. 45th street, New York. Size, 4 3/4" x 7". Price, payable in advance, \$1.00. For sale by THE METAL INDUSTRY.

This, like the above book, is also one of the Pitman series, but is written from the standpoint of an economist instead of a technician. The author, who is a Fellow of the Institute of Bankers and a member of the Royal Statistical and Royal Economic Societies of England, states that gold is important chiefly from a commercial standpoint rather than a chemical or industrial. The supreme interest in gold lies in its relation to banking and exchange. The book includes, among others, the following chapters: Properties and Distribution of Gold. The Production in Early Times, the Production of the Nine-



teenth Century, and the Present. The Gold Standard. The Movements of Gold. Stocks. Industrial Use. Gold and the Great War.

The book will be useful to anyone engaged in business, because it contains the information on economics which every progressive business man should have.

**"Industrial Oil Engineering,"** by J. Rome Battle, B.Sc., M.E. Published by J. B. Lippincott Company, Philadelphia. Size 5" x 7½". Price, payable in advance, \$10.00, plus postage. For sale by THE METAL INDUSTRY.

This is a reference book of data, tables, general oil information, engineering and industrial requirements, for the use of oil engineers, lubricating engineers, oil salesmen, oil equipment manufacturers, mechanical engineers, machinery designers, mill and power plant superintendents, purchasing agents and others interested in the selection purposes and efficient utilization of oil products and equipment, the conservation of power, and the elimination of oil wastage. It includes The Lubricating Engineer's Handbook, revised and enlarged.

This work will eventually include two volumes, of which this is the first, covering industrial oils and lubrication. It is a tremendous work, going into the subject from every angle and covering it completely. It is written by an expert and will take its place among the other standard books of authority. The features of special interest to metal trades are the following:

1. The selection and purpose of oil products and equipment. Much of the equipment is described and illustrated.
2. A large number of valuable suggestions for effecting economies in the operation of industrial equipment, and in the reduction of oil wastage.
3. A chapter on bearings and their lubrication.
4. A chapter on oil storage and handling.
5. A chapter on drawing operations and lubricants for metal.
6. A chapter on core binders and foundry practice.
7. A chapter on rust prevention—cause and rust preventatives.
8. A chapter on rolling mills and their lubrication.

**Mac Rae's Blue Book.** Published by the Mac Rae Blue Book Company, 18 East Huron street, Chicago, Ill. Size,

8½" x 11", 2,000 pages. Price, payable in advance, \$10.00. For sale by THE METAL INDUSTRY.

This Buyers' Guide contains the names and addresses of 35,000 of America's leading manufacturers, showing in thousands of cases, location of branch offices. It is indexed under 14,000 classifications of material. There is an alphabetical index to trade names of materials and the names of manufacturers thereof; also a standard list-price section. The book includes numerous tables of use to the buyer and several special features, such as a net discount computed in a handy supplement.

The manufacturers and buyers of material have long known the usefulness of the Buyers' Guide and they will find this book a great help in obtaining materials.

**Hendricks' Commercial Register of the United States—29th Edition.** Published by S. E. Hendricks Company, Inc., New York. Size 7½" x 9½". Price, payable in advance, \$12.50. For sale by THE METAL INDUSTRY.

The publishers have maintained the high standard of this book for the past 29 years, have retained all of its good features, and have added some new ones. One of the features of the book is the simple method of arrangement and complete index, making it the most easily used book of its kind we have seen, a feature which should appeal at once to the busy man. This ease of use is further increased by the exterior index, a feature added last year and continued in the new edition.

The publishers have added a page of directions, entitled "How To Find Information," which gives in concise form detailed instructions as to the best way to find desired information. From this we note that the book is divided into five sections, the "Index to Trades," "Classified Trades," "Trade Names," "Alphabetical," and "Advertisers' Index." The purpose and use of each is fully explained.

Another addition this year is a sheet of perforated post cards on which users of the book are urged to report faulty listings, wrong classifications and concerns which may have been omitted. They say, "Although every effort is made to revise thoroughly 'Hendricks' Commercial Register' every year, it is inevitable in a work of this size that errors or omissions creep in. The publishers will appreciate information as to new firms which should be listed, or ones which should be eliminated, changes of address, etc."

The use of such a book is almost indispensable in any well organized purchasing or sales department.

## CORRESPONDENCE AND DISCUSSION

Although we cordially invite criticisms and expressions of opinion in these columns, THE METAL INDUSTRY assumes no responsibility for statements made therein.

### MELTING BRASS

To the Editor of THE METAL INDUSTRY:

We are very much interested in the article entitled "Melting Brass with Fuel Oil," by S. D. Rickard, in THE METAL INDUSTRY magazine issue of October, 1920.

A paragraph of this article is given to the consideration of the relative cost of manufactured coal gas and fuel oil when used for brass melting.

The author states that 4.2 gallons of oil are equivalent to 1,000 cubic feet of gas, these figures being predicated by certain comparative heat values or B. t. u.'s of these two fuels. Upon this basis the author draws the conclusion that to melt 100 pounds of brass with fuel oil at 12 cents per gallon will cost 54 cents, as compared with a cost of \$1 using gas, assuming the price of gas to be \$1 per thousand cubic feet.

Unfortunately this statement is based on a prevailing assumption that the fuels are comparable on their B. t. u. content in the fuel state. Such assumptions overlook two very important factors, viz., utilization efficiency and the heating value of the combustible products.

The heating value of the products of combustion of gases of different characteristics is not in direct proportion to their B. t. u.

content in the fuel state. For instance, it can be easily shown that a blue-water gas having a nominal heating value of 300 B. t. u. per cubic foot will develop 107 B. t. u. per cubic foot in the products of combustion, while a manufactured coal gas of 626 B. t. u. per cubic foot will develop only 98.5 B. t. u. per cubic foot of combustible mixture. Thus showing that a gas of ½ the nominal heating value of another gas, when considered in the fuel state, will develop nearly 10 per cent more in the combustion products.

The above is merely offered as evidence of the fact that it is illogical to compare fuels on such basis.

The author does not indicate whether the figures submitted are for melting brass in crucibles or direct-fired furnaces. We assume, however, the figures are based on crucible practice.

We agree with the author's statement elsewhere in the article that the burning of fuel oil is subjected to waste and inefficiency so prevalent in this country in the use of almost all raw materials.

A few instances which have come under the writer's observation are illuminating in view of the statements given in the article. From many observations made in plants melting brass under average conditions the amount of fuel oil per 100 pounds of metal varies from 2½ to 3 gallons. This is confirmed in the report of

Dr. H. W. Gillett, in *Brass Furnace Practice in the United States* (Bureau of Mines, 1914). The report states that an average of 2.75 gallons of oil is required for 100 pounds of brass, based on the result of some 300 answers to written inquiries and personal visits to 80 foundries.

Much information is also available in the use of manufactured gas for brass melting. Numerous observations indicate that the amount of gas burned per 100 pounds of brass varies from 325 to 504 cubic feet, a fair average being 400 cubic feet.

On the basis of such practical evidence of the utilization of oil and gas, and using the author's figures as to the unit cost of the two fuels, the results appear as follows:

Gas—400 x \$1 per 1,000 cu. ft. = 44 cents per 100 pounds of brass.

Oil—2.75 x 12c. per gallon = 33c. per 100 pounds of brass.

Consequently, instead of an increased cost of gas over oil amounting to approximately 100 per cent, as stated by the author, the actual increased cost for fuel alone is but 33 1/3 per cent.

This increase is almost invariably offset by a saving in shrinkage losses, crucible life and labor.

November 12, 1920.

WM. A. EHLERS,  
Industrial Fuel Engineer.

To the Editor of THE METAL INDUSTRY:

In the limited space allowable, it is impossible to cover all of the details thoroughly. However, we sincerely hope that you can afford the space necessary to print my reply in full, as it is a subject which merits a thorough discussion.

It must be borne in mind that the writer's article was simply a plea for greater efficiency in the burning of oil and more care in the selection and installation of the necessary equipment. It was not our desire to argue against any one fuel, but to give as accurate a comparison as possible of the different fuels and aid the fuel consumer in every way possible in choosing what was best for his requirements and help him select and install the proper equipment. If Mr. Ehlers will refer to the second article of the writer's appearing in your November issue, he will see that it was pointed out that there are many difficulties which may be encountered in the selection of such equipment that make for inefficiency. It must also be borne in mind that comparisons of the different fuels are inaccurate and should not be used unless tests are carried on under similar and proper conditions.

Mr. Ehlers' letter to you does not indicate that he has thoroughly understood the writer's article. If he will again refer to the paragraph in which the comparative cost of gas and oil as fuel is mentioned, he will see that the following statement was made: "With furnaces of the same type and size, and each properly constructed for the fuel used, the **theoretical calculation** given above will work out in this way in **actual practice**." In other words, the writer stated that, roughly, 4 1/2 gallons of fuel oil of the general run are equivalent in B. t. u. value to 1,000 cu. ft. of 600 B. t. u. manufactured coal gas, and that this theoretical comparison proves to be true in actual practice **under proper conditions**.

The writer's statement was not "based on a prevailing assumption," but was based on data secured over a period of fourteen years' experience in the construction, installation and operation of high temperature furnaces burning manufactured gas, natural gas, fuel oil, gasoline, coal, coke, wood and charcoal. The correctness of this statement is also borne out by the testimony of the many fuel consumers who have changed over their plants to burn fuel oil in place of manufactured gas and have kept accurate records of their costs. Probably the most satisfactory data was secured from a test in which a certain furnace was fitted with a combination gas and oil burner, running on alternative days with the different fuels, and the production of work with each fuel compared.

The writer also knows of some cases where gas has been substituted for fuel oil, but in most of the cases coming under his observation the original oil-burning equipment was very inefficient and the engineers of the local gas company reconstructed the furnaces or installed more efficient furnaces, with the result that manufactured coal gas proved to be a more economical fuel than oil. However, if the original oil-burning equipment had been properly installed and operated, such results would have proved impossible. On the other hand, the writer has seen very efficient gas-burning furnaces reconstructed to burn fuel oil, resulting in a large reduction in fuel cost. In other cases, gas had been substituted for fuel oil where the cost of gas was excep-

tionally low—much lower than the general cost throughout the country at the present time.

The writer agrees with Mr. Ehlers that it is very illogical to compare all fuels on the basis of B.t.u. value, but in this particular case he still maintains that the comparative theoretical value works out very closely in actual practice when each fuel is properly burned.

Even Mr. Ehlers' figures properly analyzed serve to prove the truth of our statement. Assuming that 4 1/2 gallons of oil are equivalent to 1,000 cu. ft. of gas, we find that if 1 1/2 gallons of oil were required to melt 100 lbs. of brass, it would require 33 1/3 cu. ft. of gas. Of course, Mr. Ehlers gives a slightly lower figure (325 cu. ft.), but there are several cases on record of brass being melted in different types and makes of furnaces with an average oil consumption of 1.1 gallons of oil per 100 lbs. of brass and with a shrinkage of not more than .7 of one per cent of brass.

Mr. Ehlers agrees with the writer that the majority of existing oil-burning installations are very inefficient. However, present installations have demonstrated that it is much easier to install efficient gas-burning equipment than it is to select and install efficient oil-burning equipment. Therefore, it is not quite fair to compare the average of the country in the use of these two fuels as Mr. Ehlers has done. We maintain that although the average figures given are undoubtedly correct, the figure on oil consumption is much higher than it need be, due to inefficient installations.

The writer cannot understand Mr. Ehlers' statement that the increased cost of fuel is offset by saving in shrinkage losses, crucible life and labor. In cases where furnaces have been properly constructed and operated, our experience in this line has failed to disclose any advantage for either fuel in losses and crucible life. Regarding labor, there is, of course, a slight extra cost where oil is purchased in car lots, but this simply involves at most an hour or two per month of a man's time to connect the tank car with the filling hose from the underground storage tank. When the oil is delivered in tank wagons, there is no such advantage, as the oil company driver takes care of the filling of the tank.

In burning either gas or oil with a proper system, it is simply necessary to throw in the switch for the motor driving the blower, and throw it out again at night. A properly designed oil-burning furnace can be lit with just as little fuss and trouble as a gas burner—so where is the material difference in labor cost?

Fort Wayne, Ind.

November 19, 1920.

S. D. RICKARD,

Fort Wayne Oil Tank & Pump Co.

## CORROSION PREVENTION

TO THE EDITOR OF THE METAL INDUSTRY:

In the November issue of THE METAL INDUSTRY on page 524, under the heading, "Corrosion Prevention," we have noted the difficulty in maintaining nickel plated brass clips for use in film developing tanks.

May we suggest that, as an alternative to the remedy which you have suggested, your subscriber try cold rolled monel metal strip for this purpose, as we anticipate that with the use of this metal the corrosion will be so slight as to cause no trouble.

C. E. MACDONALD,

Sales Engineer, The International Nickel Company, Limited  
Toronto, Canada, November 30, 1920.

## GOVERNMENT PUBLICATIONS

**Gold, Silver, Copper, Lead and Zinc in the Eastern States in 1919.**—A mines report, by J. P. Dunlop, U. S. Geological Survey, Washington, D. C.

**Stone in 1918.**—By G. F. Loughlin and A. T. Coons, U. S. Geological Survey, Washington, D. C.

**Copper in 1918.**—(General report), by B. S. Butler, U. S. Geological Survey, Washington, D. C.

**Arsenic, Bismuth, Selenium, and Tellurium in 1919.**—By J. M. Hill, U. S. Geological Survey, Washington, D. C.

**Bauxite and Aluminum in 1919.**—By J. M. Hill, U. S. Geological Survey, Washington, D. C.

**Building Operations in the Larger Cities in 1919.**—By Jefferson Middleton, U. S. Geological Survey, Washington.

**Lithium Minerals in 1919.**—By Herbert Insley, U. S. Geological Survey, Washington, D. C.



## SHOP PROBLEMS

IN THIS DEPARTMENT WE ANSWER QUESTIONS RELATING TO SHOP PRACTICE

ASSOCIATE EDITORS { JESSE L. JONES, Metallurgical  
WILLIAM J. REARDON, Foundry

PETER W. BLAIR, Mechanical  
LOUIS J. KROM, Rolling Mill

CHARLES H. PROCTOR, Plating Chemical  
CORYDEN P. KARR, Exchange-Research

### RAPID NICKEL SOLUTION

Q.—Please give us a solution for depositing nickel rapidly.

A.—No. 1 solutions for rapid nickel deposits should be agitated and heated to 180 degrees Fahr. Composition of solution:

Water .....	1 gallon
Single Nickel Salts .....	2 lbs. to 2½ lbs.
Boracic Acid .....	4 ozs.
Sal Ammoniac .....	2 ozs.
Magnesium Sulphate .....	1 oz.

The addition of ½ oz. hydrofluoric acid per gallon of solution occasionally gives great anode corrosion and quicker deposit.

No. 2. For depositing upon wax the nickel solution must be used cold. It is an advantage to use soft steel anodes in connection with the nickel anodes. The deposit is obtained much faster than with nickel anodes. The deposit is also harder. Formula for solution:

Water .....	1 gallon
Single Nickel Salts .....	2 lbs.
Sal Ammoniac .....	2 ozs.
Magnesium Sulphate .....	2 ozs.
Boracic Acid .....	2 ozs.
Citric Acid .....	¼ oz.

The thickness of nickel required as a face for electrotypes should not be less than 1/64 inch, which should be further backed up with copper deposited from a copper sulphate solution, and then the regular stereotype metal backing.

Solutions can be readily figured out based upon the market price of materials mentioned.—C. H. P. Problem 2,888.

### PLATING REFLECTORS

Q.—Please let me know what the formula is for plating automobile headlights?

A.—We presume you refer to the reflectors of automobile headlights. The question is, what are the reflectors made of, brass or steel? If of brass, then cut down as usual with buffs, using tripoli. Then color, using white lime composition. Then

1st. Cleanse with the usual hot alkali cleaner. Then wash thoroughly in water and immerse in a cyanide dip for a moment to remove stains or oxide, and re-wash in water.

2nd. Nickel plate for a few minutes until the reflector is uniformly coated with nickel.

#### Nickel Solution.

Water .....	1 gallon
Single Nickel Salts .....	8 ozs.
Boracic Acid .....	1 "
Sal Ammoniac .....	1 "
Epsom Salts .....	½ "

Temperature normal at three volts. Nickel anodes.

3rd. After nickel plating remove and wash in water and then strike quickly in a silver strike. Use four volts or more.

#### Silver Strike.

Water .....	1 gallon
Sodium Cyanide .....	6 ozs.
Silver Cyanide .....	½ "
Sal Ammoniac .....	¼ "

Temperature normal. Use old files or sheet steel as anodes.

4th. As soon as the reflectors are struck with the silver strike, plate in the regular silver solution for five to fifteen minutes. Then remove, wash and dry thoroughly and polish for lustre with a cotton flannel buff wheel, using lamp black and kerosene oil mixed to a paste as the coloring medium, or jewelers' rouge in powder mixed with denatured alcohol.

#### Regular Silver Solution.

Water .....	1 gallon
Sodium Cyanide .....	2½ ozs.
Silver Cyanide .....	2 "
Sal Ammoniac .....	¼ "

Voltage from 2 to 3. Silver anodes.

If the reflectors are made of steel then polish with tampico wheels and emery paste. Cleanse as usual, then copper plate in a hot copper solution as follows:

Water .....	1 gallon
Sodium Cyanide .....	4½ ozs.
Copper Cyanide .....	4 "
Bicarbonate of Soda .....	1 "
Bisulphite of Soda .....	½ "

Temperature 140° Fahr. at 3 to 4 volts. Copper anodes.

Copper plate from 20 to 30 minutes or less, then wash, dry and color up the copper deposit. Then proceed as outlined.

Cleanse, nickel plate, silver strike and finish in regular solution and final polish.—C. H. P. Problem 2,889.

### RUST PROOFING DIES

Q.—What is the best way to prevent dies and other steel articles from rusting?

A.—The most effective method of preventing dies and other steel tools or articles from rusting would be to zinc plate them and afterwards immerse them in a mixture of equal parts of paraffine oil and paraffine wax heated to 212° Fahr. The wax combination alone will protect them for a considerable time, especially if about 1 per cent beeswax is mixed with the paraffine wax. Rust proof greases can be obtained from F. Houghton & Company, Philadelphia, Pa. They are used to a very great extent for similar purposes.

An electro-zinc solution for zinc plating should be prepared as follows:

Water .....	1 gallon
Sodium Cyanide .....	3½ ozs.
Zinc Cyanide .....	4 "
Caustic Soda 76 per cent .....	2 "
Soda Ash 58 per cent .....	2 "
Sulphate Aluminum .....	¼ oz.

Temperature of solution 120° Fahr. at 3 volts. Anodes of cast or sheet zinc are necessary.—C. H. P. Problem 2,890.

### VARNISH STOP-OFF

Q.—We do a considerable amount of gilding on portions of our horns, particularly the pattern which is engraved on the bell. The rest of the surface must be covered with some varnish or other material which will not be attacked or loosened by the hot gold solution which is kept at a temperature of about 140°. The method used is to paint the varnish up to the pattern, leaving it only exposed, and after the gold has been deposited on the pattern, we loosen the varnish by some sort of remover.

We have been advised to use a so-called Trinidad Asphaltum, which we reduce with turpentine, but the material is not entirely satisfactory and is difficult to remove. You might know of something better for the purpose, in which case we would be glad to have you advise us. It is also necessary in this connection that we find a suitable remover for whatever varnish is recommended.

A.—Trinidad or Egyptian Asphaltum dissolved in turpentine to the proper consistency by the aid of a hot water bath produces an excellent material for stopping off purposes such as you require in part gilding.

The varnish so prepared can be readily removed after plating operations by immersing the instruments in benzine, gasoline or tetrachlorethane.

Mogul is another excellent material and is used to a great extent. It is a type of asphaltum varnish. The material can be procured from Mogul Company, 45 West 34th Street, New York City.

Gum ginnacum dissolved in acetone by the aid of a hot water bath to the proper consistency produces an excellent stop-off varnish. It, however, should be colored with aniline blue or violet so that the varnish is more distinct when applied. Acetone, wood alcohol or tetrachlorethane may be used to dissolve the varnish afterwards.—C. H. P. Problem 2,891.

### DIE CASTING ALLOY

Q.—In die casting an alloy is used that appears to have the strength approximating cast iron, yet of low melting point and inexpensive. We believe the mixture contains a large proportion of zinc.

Can you give us the recipe for such an alloy, for we would like it in the making of hand wheels for valves?

A.—The zinc alloy that you mention is made up approximately as follows:

Zinc .....	87.5
Tin .....	8
Copper .....	4
Aluminum .....	.5

Its properties, etc., can be found in an article on die-castings by Charles Pack on page 410 of THE METAL INDUSTRY for September, 1920.—A. B. Problem 2,892.

### POLISHING STEEL ARTICLES

Q.—How do they get the high color on ruling pens (steel)? The concave turns brown when finished and left to lie around. Have tried putting them in oil, but seems it does not help any. These pens are colored on block wheels rolled in flour emery and worked down with crocus or rough. The oil that they are put in to keep from rusting is a common grade of machine oil.

How are the legs of compasses polished and buffed to keep the flat surface perfectly flat? This metal is German silver and is polished on blocked wheels, rolled in 180 emery and finished on block wheels, rolled in flour emery. The buffing is done on sewed buffs. Have tried hard felt to buff and then color on rag buff, but the edge is turned. Are any special kind of wheels used in the different operations; if so, what kind?

A.—So far as we are able to determine, all steel pens are polished by mechanical tumbling process.

The first operation includes tumbling in a grit that is imported. Then flour emery and oil, and finally with crocus and sole leather chips.

The brown color is produced by heat, usually by tumbling in a manner similar to coffee roasting, in a revolving iron drum, externally heated with gas, coal or charcoal. Charred sawdust or leather may be used with the pens in the tumbling operation for coloring.

No. 2. It is possible that the legs of compasses made from German or Liberty silver are sand buffed to give the cutting-down operation, and then finally buffed with a lime composition and sheep-skin buffs.

Sand buffing is used extensively in polishing hollow ware and German silver spoons. The method enables the edges of objects with sharp edges to be maintained square instead of round.

Fine French or Albany molding sand is used with small muslin buffs. A tray holds the sand and the polisher keeps picking it up on the articles and applies it to the buff, which gives the cut-down finish desired without rounding the edges.

It might be possible to use tampico wheels with an emery paste; this material might be worth trying for the cutting-down operation.—C. H. P. Problem 2,893.

### POLISHING ZINC

Q.—I am having trouble in polishing zinc sheets, sizes 20 x 25 inches. My trouble is lines in the stock that appear to be put in by the polishing compounds that I am using.

My present method is that I run these sheets on an average of 12 times on a felt wheel with No. 1½ pumice and oil, then on a felt wheel about 8 times on a No. ½ pumice, then about six times on a No. 0 pumice. Felt wheels run at 270 revolutions per minute, felt wheels about 36 inches in diameter. From the felt wheels we use an 18-inch sewed buff with tripoli compound, speed 1,680 from that with finish on an unsewed soft 18-inch buff, speed 1,680, with Acme white finish. This process is not as good as we would like to produce. We want to eliminate the scratches in the stock and produce a high lustre.

A.—In polishing zinc there is one important factor to be remembered and that is to keep the metal as cool as possible, while polishing, otherwise streaks and blisters will appear as the polishing proceeds. Your polishing should be done in three operations, viz.:

1st. Cut down with tampico wheels and flour emery paste to remove deep scratches and lines.

2nd. Cut down with tripoli, applying kerosene oil to the buff as a lubricant; just a very little to prevent the buff clogging up with zinc, which causes scratches and prevents a mirror finish being obtained.

3rd. In the final coloring use Acme composition with soft buffs. Use a little kerosene as outlined.

Or you could mix gilders' English floated whiting with denatured alcohol to a paste, then add a little kerosene to prevent evaporation. This mixture should give you the desired lustre in the final buffing operation.—C. H. P. Problem 2,894.

### SLUSH METAL

Q.—We have an inquiry for slush metal, which is a white metal, for making white metal ornaments.

Be good enough to let us know just what mixture is used, as we wish to use new lead, new tin and new antimony.

A.—Slush metal is made up as follows:

1. Light casting with fine details:  
Lead 86, antimony 14.
2. Medium weight:  
Lead 87-87½, antimony 12½-13.
3. Plain work:  
Lead 88-89, antimony 11-12.

These antimonial lead mixtures are the ones most commonly used for slush castings. Some firms, however, use Britannia metal of a good grade or zinc. The Britannia metal will be stronger, but will not give the sharp details that the antimonial lead produces.—A. B. Problem 2,895.

### SMOOTH CORE MIXTURE

Q.—What is a good mixture to make a smooth core for vacuum cleaner work?

A.—For a mixture of core sand to make a smooth core for vacuum work I would suggest:

No. 1. Mixture:

20 14-qt. Pails Michigan City sand  
3 qts. Linoil

No. 2. Mixture:

16 14-qt. Pails Rochester sand  
10 14-qt. Pails Delray sand  
4 14-qt. Pails Michigan City sand  
7½ qts. Rosin  
7½ qts. Dextrine

All these sands are easily obtainable in Michigan.

If extra smooth castings from the core are desirable blow on the cores before baking with a blow can a mixture of Bull Run talc, taking

20 parts water  
1 part glutrine

and mix to a consistency of a light blacking for core work.—W. J. R. Problem 2,896.

### SOLDER

Q. What is the composition of the white solder used on German Silver?

A. The white solder about which you ask in your letter of November 20, is probably argantan, sometimes called a "silver" solder made up approximately as follows:

Easily Fusible.

Copper 35  
Zinc 57  
Nickel 8

Less Fusible.

Copper 38  
Zinc 50  
Nickel 12

For your purpose we believe that the easily fusible solder is the better.—A. B. Problem 2,897.



## PATENTS

## A REVIEW OF CURRENT PATENTS OF INTEREST

1,350,714. Aug. 24, 1920. **Process of Treating Metals and Alloys.** Charles Bruce Foley, Brooklyn, N. Y.

The process of treating molten metals which comprises reducing the metals to a molten state, passing an induced electric current through the mass, and maintaining at each locality of heat addition by said current a hydrostatic head which exceeds the vapor tension of the mass at the temperature there being generated.

1,350,865. Aug. 24, 1920. **Metallurgical Furnace.** Daniel E. Griffiths, Pittsburgh, Pa.

A rotary furnace arranged to receive the material to be treated, a relatively stationary burner within said furnace having downwardly extending fuel and air ports, means for delivering gaseous fuel and air to said ports, means to rotate said furnace, a blast pipe extending longitudinally in the wall of said furnace, means for supplying a blast of air to said pipe, there being a plurality of tuyers communicating with said pipe, automatic means controlled by the rotation of the furnace for opening and closing communication between the tuyere openings and said blast pipe, and means for cooling the walls of the furnace and the burner; substantially as described.

1,350,972. Aug. 24, 1920. **Method of and Apparatus for Pouring Molten Metal.** King Irvin and Andrew Lennox, Washington, D. C.

The new and useful method of pouring molten metal, which consists in disposing a mold with one wall thereof at an angle to the vertical, continuously retarding the flow of and coincidentally spreading the molten metal laterally while the molten metal is *en route* to the mold, and delivering the molten metal to said inclined wall of the mold.

1,351,051. Aug. 31, 1920. **Method of Making Sound Brass Castings.** Leon McCulloch, Wilkesburg, Pa., assignor to Westinghouse Electric & Manufacturing Company, a corporation of Pennsylvania.

The method of making sound castings of copper or copper alloys which comprises oxidizing and consequently removing absorbed hydrogen from the molten metal prior to casting.

1,351,144. Aug. 31, 1920. **Process of Electrically Depositing Aluminum.** Glen Lenardo Williams. New York, N. Y., assignor, by mesne assignments, to Henry Walton Campbell, Detroit, Mich.

The process of producing aluminum which comprises electrolyzing an aluminum sulphate while dissolved in a normally liquid anhydrous vehicle inert to aluminum and of higher electrical resistance than the aluminum sulphate to be electrolyzed while in a heated condition.

1,351,247. Aug. 31, 1920. **Combination Ladle and Babbitting Jig.** Wilbur J. Hempy, Kansas City, Mo., assignor to Hempy-Cooper Manufacturing Company, a corporation of Missouri.

In a device of the character described, a bottom pouring ladle adapted to rest upon a bearing to be babbitted, means for controlling the outflow of molten metal from said ladle to the bearing, and a member associated with said ladle and arranged to occupy the position of a shaft in the bearing to mold the molten metal to receive such shaft.

1,351,346. Aug. 31, 1920. **Ingot Mold.** John T. Rowley, Pittsburgh, Pa.

In a casting apparatus, the combination of a mold comprising two sections, the said sections being connected by toggle members, means to operate said toggle members, a water jacketed neck piece constituting the upper end of the mold sections adapted to receive the metal initially, the lower end of said mold sections being closed by a water jacketed door, and means to swing said door into open position simultaneously with the opening of the mold sections.

1,351,404. Aug. 31, 1920. **Babbitt Metal Product and Process of Making Same.** Louis Sapery, Brooklyn, N. Y.

The process of protecting Babbitt metal from oxidation while being melted, which consists in coating the Babbitt metal, prior to melting the same, with a thin film of another metal which is without injurious action on the bearing qualities of the Babbitt metal and which has a melting point that is substantially higher than that of the Babbitt metal.

1,351,673. Aug. 31, 1920. **Alloy.** Foster Milliken, Lawrence, N. Y., assignor to Foster Milliken, S. Fullerton Weaver, and James M. Repplier, trustees.

An alloy formed from copper 42 to 52 per cent., nickel 22 to 28 per cent. and lead 22 to 30 per cent.

1,351,684. Aug. 31, 1920. **Method and Apparatus for Uniting Together Pieces of Brass, Aluminum and Similar Metals or Alloys by Electric Resistance Heating.** Norbert Prostler, Berlin, Germany, assignor, by mesne assignments, to The Chemical Foundation, Inc., a corporation of Delaware.

The method of uniting brass pieces by electric resistance heating, which consists in subjecting the brass pieces to be united to a gradually increasing yielding electrode-pressure, closing the electric welding circuit, and when a fusion has been produced by the electric current at the place of welding, transforming said gradually increasing electrode pressure acting upon the brass pieces into a non-yielding pressure adapted to render the uniting of said brass parts more perfect.

1,350,709. Aug. 24, 1920. **Method of and Article for Alloying Tungsten.** John Howard Deppeler, Weekhawken, N. J., assignor to Metal & Thermit Corporation, Chrome, N. J., a corporation of New Jersey.

The method of forming an alloy of tungsten with another metal which comprises compressing tungsten powder into dense, coherent, self-sustaining tablets, and adding the tablets to the alloying metal.

1,351,717. Aug. 31, 1920. **Duplex Rotary Electric Welding Machine.** Joseph Ledwinka, Philadelphia, Pa., assignor to Edward G. Budd Manufacturing Company, Philadelphia, Pa., a corporation of Pennsylvania.

In an electric welding machine, a frame, a transformer mounted therein, welding electrodes arranged in the secondary circuit of said transformer, a power driven shaft journaled in said frame, and connections operated thereby, and including friction disks yieldingly held in contact with each other for reciprocating one of said electrodes toward and from the other.

1,352,271. Sept. 7, 1920. **Alloy.** Zay Jeffries and William A. Gibson, Cleveland, Ohio, assignors to The Aluminum Castings Company, Cleveland, Ohio, a corporation of Ohio.

An alloy containing aluminum, copper, zinc and iron, the copper content being from 2 per cent. to 5 per cent., the zinc content being from 4 per cent. to 25 per cent., the iron content being from 0.6 per cent. to 1.8 per cent., and the aluminum making up the remainder.

1,352,231. Sept. 7, 1920. **Process of Electroplating Non-Conducting Substances with Copper.** Umikichi Unno, Tokyo, Japan.

The method of electrolytically depositing metal upon an article made of a non-conducting substance which consists in impregnating the article with a mixture of bees-wax, paraffine wax and white wax, preparing a coating mixture by mixing together relatively large proportions of graphite and sulphuric ether, and relatively small proportions of mercury and gold chlorid, drying and powdering the mixture, and coating the impregnated article therewith, then immersing the article so coated in a bath of electrolyte and electrolytically depositing a metal on said article while so immersed.

1,352,328. Sept. 7, 1920. **Nickel-Plating.** Edmund N. Todd, Milburn, and Willis R. King, Newark, N. J., assignors to The Hanson & Van Winkle Company, Newark, N. J., a corporation of New Jersey.

An electroplating mixture comprising sulphate of nickel and ammonium and an admixture of gum tragacanth.

1,352,322. Sept. 7, 1920. **Metallic Alloy and Method of Making Same.** Theron D. Stay, Cleveland, Ohio, assignor to The Aluminum Castings Company, Cleveland, Ohio, a corporation of Ohio.

An aluminum alloy composed of aluminum in a predominating amount, copper in appreciable amounts and titanium.

An aluminum alloy composed of aluminum in a predominating amount, copper in appreciable amounts and titanium up to 0.10 per cent.

An aluminum alloy containing aluminum, copper and titanium in approximately the following proportion by weight: Aluminum 88 per cent. to 90 per cent., copper 12 per cent. to 10 per cent., and titanium 0.10 per cent. approximately.

An alloy of aluminum, copper and titanium, in which the aluminum largely predominates, which is characterized by low crystallization shrinkage, and, in the solid state, by relatively great hardness and a fine-grained structure having good bearing qualities.

The method of forming an alloy containing a metal of relatively high melting point and a metal of relatively low melting point which consists in first forming an alloy whose constituents include the said high melting point metal and a metal having a melting point between those of the other two metals, and then combining with the last named alloy said low melting point metal.

1,352,430. Sept. 14, 1920. **Induction Solder Pot Heater.** Ora A. Colby, Irwin, Pa., assignor to Westinghouse Electric & Manufacturing Company, a corporation of Pennsylvania.

In an electrically-heated apparatus, the combination with a container and supporting means therefor, of a transformer having primary and secondary windings, a grid resistor connected to the secondary winding of said transformer, said resistor being wound first in one direction around said container and then wound in the reverse direction a substantially equal number of turns, and means on said resistor for supporting it on said supporting means.

1,352,493. Sept. 14, 1920. **Rolling Mill.** Ludwig Wolffgram, Erie, Pa.

A rolling mill comprising a series of pairs of grooved rolls spaced apart and arranged in succession, the rolls of each pair being parallel and alternate pairs of rolls being disposed at acute angles to the intermediate pairs of rolls; the passes of the rolls of successive pairs being in arcs reduced in succession and having triangular extensions reduced in succession, a succeeding pair of rolls having its pass in arcs the same as the preceding set of rolls and with reduced triangular extensions, and a final pair of rolls having a circular pass of the same diameter as the pass of the preceding pair of rolls.

1,352,760. Sept. 14, 1920. **Universal Metal Cutting Apparatus.** Stuart Plumley, Westfield, N. J., assignor to Davis-Bournonville Company, New York, N. Y., a corporation of New York.

In an apparatus of the kind described, having a frame universally movable in horizontal directions, a mechanically-driven tracer device comprising a member rotatable about a vertical axis and having coaxial friction-top-bearing and roller-side-bearing portions to co-operate with a guide or templet.

1,352,813. Sept. 14, 1920. **Machine for Forming Metal.** Cass L. Kennicott and Charles P. Kemble, Chicago Heights, Ill.; said Kennicott assignor, by mesne assignment, of his entire right to Abner C. Harding, Chicago, Ill.

A machine for forming metal comprising a frame, a pair of geared roll-shafts mounted in the frame, a plurality of annular members sleeved upon the said roll-shafts and detachably secured thereto, certain of said annular members on one roll-shaft con-

stituting male forming dies and the opposed annular members on the other roll-shaft constituting female forming dies removable elements inserted in the peripheral surfaces of said annuli and constituting portions of the forming surfaces thereof, and a stop on one of said rolls for positioning the metal to be formed.

1,352,912. Sept. 14, 1920. **Process and Apparatus for Reclaiming and Refining Copper and Other Metals.** Allen R. Partridge, Cleveland, Ohio.

A process for reclaiming and refining metals consisting in heating the materials from which the metals are to be reclaimed to a melting temperature, then reducing the heat to cause said materials to "sweat" and trickle down an incline, and then admitting oxygen to the trickling material for purifying the same, substantially as described.

1,353,126. Sept. 14, 1920. **Process of Treating Molten Metal.** Otto Thiel, Landstuhl, Germany, assignor, by mesne assignments, to The Chemical Foundation, Inc., a corporation of Delaware.

The herein described process of treating molten metal and slag to remove the slag which consists in adding to the molten metal a quantity of unmelted metal of a similar kind to cause the slag to flow away from the surface of the molten metal in quantity corresponding to the quantity of unmelted metal added.

1,353,526. Sept. 21, 1920. **Rotary Sheet Metal Cutter.** Fred Frengle, Cotati, Calif.

A rotary sheet metal cutter, comprising a frame having a pair of spaced apart outstanding brackets disposed in the same vertical plane, a vertically disposed screw carried by the upper one of said brackets, a vertically disposed shaft rotatably and slidably carried by the other of said brackets, said screw and shaft being disposed in axial alignment with each other and having one end pivotally connected together, a screw-threaded cross-bar carried by the free end of said shaft and having its ends extending at substantially right angles from opposite sides of the shaft, said cross-bar movable longitudinally in either direction by rotating it relative to the shaft, nuts on said cross-bar engageable with opposite sides of the shaft for normally preventing movement thereof relative to said shaft, a rotary cutting disk on one end of the cross-bar, a roller on the other end thereof, a die underlying said cross-bar and co-operating therewith for cutting circular openings in sheet metal, and means for supporting said die.

1,353,773. Sept. 21, 1920. **Process of Treating Copper Bearing Alloys.** William Judson Marsh, Niagara Falls, N. Y., assignor to Hooker Electrochemical Company, New York, N. Y., a corporation of New York.

Process of treating copper bearing alloys, comprising reacting thereon with an aqueous solution containing cupric chlorid while maintaining the cupric chlorid content of the solution.

1,354,018. Sept. 28, 1920. **Bronzing Machine.** Addison W. Brock, Baltimore, Md., assignor to H. Gamse & Bro., Baltimore, Md.

A bronzing machine comprising an endless carrier, guide wheels about which said carrier moves with its upper and lower stretches substantially horizontal, grippers on the carrier for taking and releasing sheets, and means for supplying bronze to the sheets as they are being transported by the carrier.

In combination in a bronzing machine, a carrier for the sheets, a hopper for supplying the bronze material, a roller at said hopper having a portion of its periphery exposed at the lower end of the hopper for the delivery of the material onto the sheet, means for rotating the roller and adjustable means for limiting the length of the hopper space available for holding the bronze and consequently the effective length of the roll, substantially as described.

In combination with carrier means for transporting sheets, means for supplying bronze to the sheets, and rubbing means comprising a plate or bar, hangers for holding the same, an upper plate, springs for pressing the upper plate toward the lower plate and textile material extending over the lower face of the lower plate with its edges held between the plates, substantially as described.



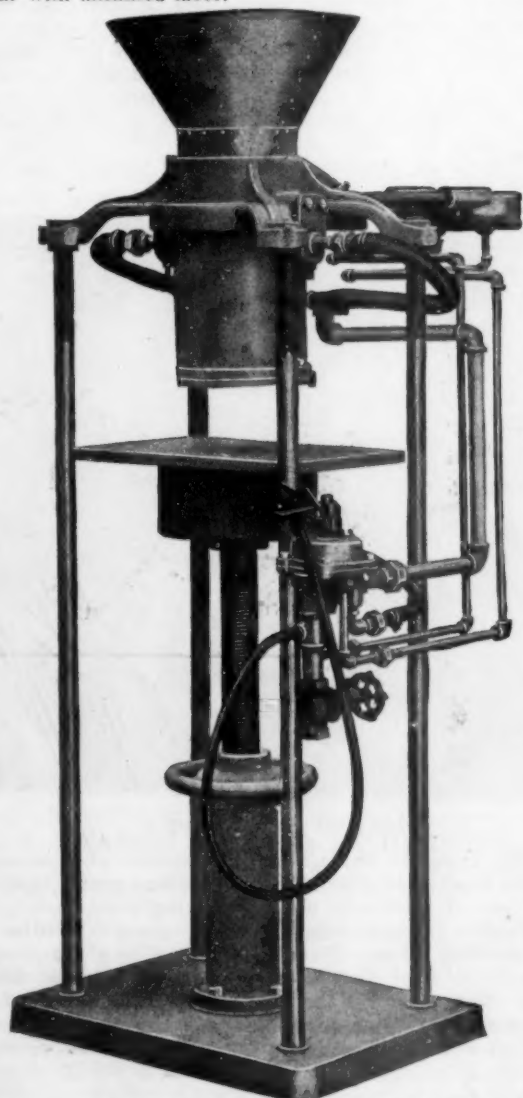
## EQUIPMENT

NEW AND USEFUL DEVICES, MACHINERY AND SUPPLIES OF INTEREST

## NEW CORE MACHINE

Core machines are no longer a foundry luxury. In the present era of high wages, to say nothing of the scarcity of competent labor, every foundry manager must be on the alert for new machinery and equipment which will enable him to economize.

The foundry engineers of the E. J. Woodison Company have designed a new core machine, in which compressed air turns the trick. The machine has been installed in a number of plants and various foundries report being able to make up to 180 cores an hour with unskilled labor.



NEW WOODISON COKE MACHINE

The machine is so designed that the operator places the core box on the machine, turns a handle a quarter turn, and the core is completed. Cores made on this machine are said to have the advantages of uniform density and a natural venting because the air is forced through the core, carrying the fine sand to the outside, giving a smooth surface, and allowing all gas to pass off freely.

The machine is practical for two part or split core boxes that ordinarily have to be made in half, and either pasted together, or the box closed while green. When this is done, sand gets in box. With the new Woodison-Cappell Pneumatic Core Machine the joint and results in a core that is larger than the actual core it is claimed that this is not possible, because the box is closed, and sand forced into the end, thus giving a core of actual size.

## NEW BEARING METAL

By the organization and financing by Los Angeles capitalists of the Super-refining Process Corporation, a holding concern, and the Super-Refined Metals Company, an operating organization, there has been launched in San Francisco, it became known, a new industrial enterprise of country-wide scope, as the result, the organizers state, of exhaustive research carried on during the past eighteen months by the best engineers and technical men available in the United States to develop the Kelly process for super-refining and alloying metals.

The process is the discovery of S. H. Kelly of Los Angeles formerly a chief engineer of the United States transport service, and is now controlled by John B. Miller, president of the Southern California Edison Company; Henry M. Robinson, president of the First National Bank and the Los Angeles Trust and Savings Bank; W. E. Dunn, Henry E. Huntington's western representative; William R. Staats, banker and financier; George L. Cochran, president of the Pacific Mutual Life Insurance Company; W. H. Davis, vice-president of the same concern; Dr. E. A. Bryant, medical director of the Southern California Edison Company, Los Angeles Street Railway, etc.; W. L. Valentine, of the Fullerton Oil Company; Alfred H. Wilcox, capitalist; W. A. Barker of Barker Bros., Inc.; Harry J. Bauer, formerly general counsel of the Southern California Edison Company, now vice-president of the Wallace Refineries, and G. A. Beaton, who becomes president of both companies.

Under the Kelly process a permanent and thoroughly homogeneous amalgamation of copper and lead, in any proportions, takes place, it is claimed. Innumerable attempts and experiments have been made to work out such an amalgamation, but because of the widely differing melting temperatures and the wide difference in specific gravity of the two metals, failure has resulted, it is declared. The metal has, it is claimed, passed government tests, and met all requirements for marine engines, automobiles and motor trucks, etc.

While W. H. Kelly has been making super-refined Babbitt metal for bearings for the past six years, it was only approximately one year ago that the Los Angeles capitalists began their investigations, and since that time every possible check of the process has been made in scores of plants and laboratories.

In addition, the organization has back of it the actual results obtained by the Kelly metals during the six years in which Kelly carried on his own manufacturing.

So far, commercial use of the Kelly process has been limited to alloys, where copper and lead predominate, for bearings, metallic packing, brake and clutch linings, and attention has been given chiefly to the production of Kelly bearings metal, super-refined bronze and super-refined babbitt metal for bearing service.

In the future the operation of the companies will be as follows: All non-ferrous metals and their products, including bearing metals, metallic packing and brake and clutch linings are to be controlled and handled by the Super-Refined Metals Company; everything beyond this in the development of new fields and new uses for the process is controlled and will be carried on by the Super-Refining Process Corporation, and in both cases Los Angeles is to be the general headquarters and the center of operation.

New factories are to be built in Detroit and Chicago and the present factory at 315 West Avenue 33, Los Angeles, is to be greatly increased in size. It is proposed later to install and put into operation other plants at suitable locations throughout the country.

The first bearings of Kelly metal were installed in the first cylinder grinder brought to Los Angeles more than six years ago. While other bearings in this grinder, running at 10,000 revolutions per minute, seldom lasted more than a few hours, the first set of Kelly metal bearings put in the same grinder are still in use.

## LUBRICATION AND ITS IMPORTANCE

By A. H. NOYES, PRESIDENT OF HILLS, McCANNA COMPANY,  
CHICAGO, ILL.

Irrevocable damage is caused by two metal surfaces sliding, rolling or grinding over each other, if there is no lubricating substance between. Ever since machinery has been in existence, lubrication has been its companion, in fact it existed even before there were machines, when it was simply a case of reducing the power necessary to push one surface over another. People did not know the word friction, did not even know what lubricant meant, but they did know that a little bit of fat or grease made the sliding a lot easier.

Even today, in the Island of Madeira, the natives' ox-carts have runners instead of wheels, and to assist the patient animal, the driver runs ahead with the "grease rag," with which he smears the cobble stones of the roads. From years of greasing they look like polished ebony.

Lubrication is one *sine qua non* of industry. This seemingly unimportant thing becomes of prime importance, and must be considered from two view points. The first of these is the selection of the lubricant, and the second is the continuous application of this lubricant to the bearings, in the amount required.

The man with the oil can is often more important than the president of the company, his mistakes would sometimes be more costly, and both the president and the oiler were liable to error. Some accurate and reliable lubricating instrument had, therefore, to be devised. There were, however, certain advantages that the human oiler did have: the machine which should replace him must incorporate all of these advantages to a higher degree, and it must not get out of order. So came into existence the force feed lubricator.

The best modern force feed lubricators have heaters incorporated in them, and they are more oblivious to cold than any man. They do not solidify in winter, therefore, and they do not overfeed in summer. The only way to avoid dust clogging was to place the oil in a solid box free from the working parts. This principle, as soon as discovered, was applied in the most advanced type of pumps. In this way it was made absolutely impossible for flying dust and grit to get into the oil and be carried to the bearings.

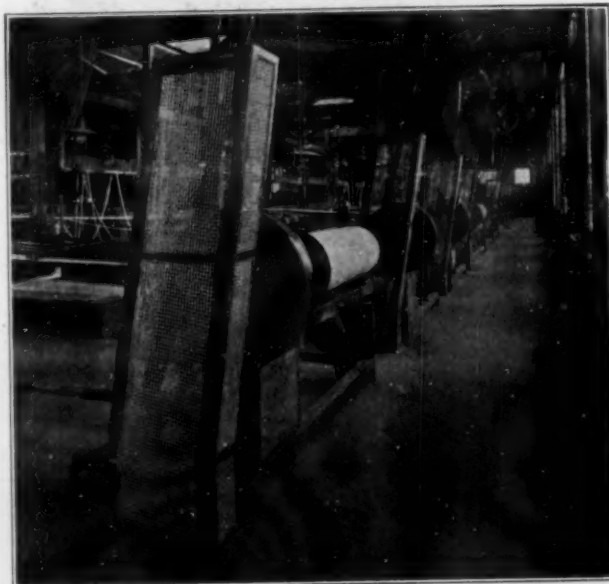
Pumps of all sizes are in use, from the very small, one-feed pump, to the one holding several gallons of oil and delivering by 40 feeds. The larger pumps, or, as they may be called, pump systems, are designed for the location they are to occupy. The lubrication of an entire plant is thus controlled from a central point. The economic advantage of such a system is unquestionable. To such an extent is this recognized that practically all the large power plants and all marine engines are equipped with the automatic force feed pumps.

Although accuracy and reliability of action were probably the chief considerations in the mind of the originators of these pumps, yet they have been found to effect a very great economy in oil, as well as in man power. Some of the pumps are credited with saving from 50% to 80% of oil—a not insignificant matter in these days, and the cost of the wage which would be paid to an oiler doing the work of its forty feeds.

## NEW SAFETY DEVICE PLANT

The Orr Machine Guarding Company has completed the erection of a modern plant at a cost of \$45,000 at Calhoun street and Pashley avenue. It is one of the most unique of Trenton's varied industries. The plant, which contains the latest types of machinery, was recently placed in operation. The Orr Company manufactures safeguards for belts and gears under the trade name "Anglemesh," which bears a nation-wide reputation among the largest manufacturing concerns in the country. The plant is built of steel and brick on a plot 130 by 50 feet, one and two stories. The company has installed a rest room, shower baths, bubbling fountains and lavatories for the employees.

The Orr Machine Guarding Company is the only concern in the country that specializes in manufacture, designing and installation of factory safeguards. The company was incorporated in September, 1916, and since that time has occupied three buildings, each larger than the other and it is estimated that the capacity output at the new plant will amount to a quarter million dollars yearly. The company has installed guards at all the famous DuPont plants, the United States Rubber Corporation, the National Fireproofing Company, Tidewater Oil Company and other big concerns.



BELTING SAFEGUARDS.

The Orr Company employs safety engineers who personally visit plants in all parts of the country and design guards especially for the type of machinery used. Following their manufacture at the Trenton plant a corps of mechanics are detailed to the factory to install them. These guards have been approved by the New Jersey State Department of Labor and similar departments in other states. Walter H. Orr is at the head of the guard company. Robert A. S. Lanning, Harry B. Hills and Harry B. Westenger comprise the company's staff of safety engineers.

## ASSOCIATIONS AND SOCIETIES

REPORTS OF THE CURRENT PROCEEDINGS OF THE VARIOUS ORGANIZATIONS

## AMERICAN FOUNDRYMEN'S ASSOCIATION

Mr. W. R. Bean was elected President and Mr. C. R. Mesinger, Vice President. New Directors are Messrs. B. D. Fuller, Defiance Paper Co., Niagara Falls, N. Y.; G. H. Clamer, Ajax Metal Co., Philadelphia, Pa.; Fred Erb, Packard Motor Co., Detroit, Mich., and L. W. Mueller, H. Mueller Mfg. Co., Decatur, Ill. These gentlemen were elected shortly after the Columbus meeting in October, 1920.

Following is a brief summary of membership gain for the past sixteen months:

Total book membership to June 30, 1919, 1097; new members elected 683, (a gain of 62%); resigned or dropped, 118. Total membership to November 1, 1920, 1662; net gain 565, or 51.5%. Credit for this record belongs to your Promotion and Membership Committee, of which Mr. A. E. Howell has been Chairman for the past two years, and the splendid co-operation of many of our members. The names of the Committee are shown on this letterhead.

No action has been taken in regard to the place of next year's Convention. All invitations have been referred to the Board of Directors for consideration.



## INSTITUTE OF METALS DIVISION

The Executive Committee of the Institute of Metals Division met at dinner during the Columbus convention. At this meeting the Messrs. Clamer, Jones, and Patch were appointed as a Nominating Committee. This committee announced the following nominations for officers of the Institute of Metals Division for next year: Chairman, W. H. Bassett; Secretary, W. M. Corse; Executive Committee, W. B. Price, H. J. Roast, P. D. Merica, C. H. Bierbaum, George K. Elliott, W. K. Frank, P. E. McKinney, C. H. Mathewson, W. A. Cowan, and F. L. Wolf. The election will take place at the February meeting.

### BOSTON BRANCH, A. E. S.

The Boston Branch met November 6, 1920, instead of Friday the 5th with Pres. Francis Mackie in the chair. Two applications were received and referred to the board of managers. The report of the committee on the banquet was made and they were given full power to go ahead with their plans. The banquet will be held on Lincoln's Birthday, Saturday, February 12, 1921, at the Quincy House, Boston, and will be \$3.00 a plate. Boston Branch looks to making its first banquet a grand success and one that will be remembered for a long time to come. We expect some of the leading men of Boston and around the state to attend. After the regular order of business we had with us one of the best known men in the A. E. S., Mr. John Hogaboom, who gave us a very interesting talk on the Working of the Brass Solution, telling of the troubles that platers have with the brass solution, how to get the best results, how to care for the solutions and overcome these troubles. He also gave a little talk on how the work is prepared for plating, and how it is cleaned and made ready for the bath at his place of business. A vote of thanks was given Mr. Hogaboom for his very interesting talk. A discussion on his talk was held and he answered all questions put to him.

At the meeting of November 19, 1920, two applicants were elected to membership. Mr. Herrick reported for the banquet committee which was very favorable. The vote taken by this branch on the amendment to the constitution, Part 2, Act 2, Sec. 3, was as follows: for the proposition, 14; against the proposition, 2. A motion was made to close the temporary charter and that the secretary be instructed to apply for a permanent charter. A discussion on different plating barrel solutions followed, lasting more than two hours. The subject for the next meeting will be the sulphate of zinc solution.

### A. E. S. BRANCH FORMED AT READING, PA.

The following members of the Philadelphia branch went to Reading, Saturday night, October 23:

Samuel Barr, Charles Bayer, C. E. Bamberg, J. L. Dinan, John B. Fay, P. Gorling, E. T. Homan, A. Kieser, D. A. Metz, G. H. Keif, M. Smith, H. Seaser, Philip Uhl, William P. Scott and William M. Fisher.

They held a very interesting and successful meeting, and formed the Reading branch with a membership of fifteen. This comprises over 50 per cent of the foremen platers of Reading and means the sure success of the branch. Never has there been more enthusiasm or real spirit demonstrated at any meeting of the society than the Reading foremen showed in this, their initial meeting. The Philadelphia branch brought along with them the following eminent authorities on the respective subjects connected with plating matters, which gentlemen spoke ably and most interestingly and demonstrated to the Reading foremen and employers the great advantages to be obtained from this purely educational and worthy society:

Dr. Hiram S. Lukens, of the University of Pennsylvania; on the action of the current in plating solutions.

Floyd T. Taylor, electrical engineer; on the different types of electro-plating generators, explaining the advantages of the compound wound over the shunt wound and the interpole types, and of the shunt wound over the interpole type.

L. E. Sturdevant; on the development of the lacquer industry and the use of the lacquer in the metal finishing trade.

J. E. Sterling, secretary and treasurer of the supreme body of the society, also spoke on the advantages of the society to the plater, and ably assisted in the organization of this branch.

All of these gentlemen were given hearty applause, as their subjects proved not only of great interest but of great value to all present.



READING BRANCH ORGANIZERS

All arrangements for this meeting, and for the social and educational good of those attending, were in charge of the membership committee of the Philadelphia branch—John B. Fay, chairman. The committee is to be congratulated on its good work.

The Reading organization appointed L. J. Rathman and C. H. Bingham, temporary chairman and secretary, respectively, and at a later meeting, L. J. Rathman was elected president; W. M. Fisher, vice-president; C. H. Bingham (127 Greenwich street, Reading, Pa.), secretary-treasurer, and Messrs. Howard Strunk, C. F. Harbester and F. E. Schadel, the trustees.

At this later meeting they appointed November 4 as the date for their first real meeting and sincerely trust that some of the older members of the society will make it a point to attend that meeting, where they will be heartily welcomed. There is no doubt but what Reading will soon be one of the liveliest and best branches of our society.

### NEW YORK BRANCH, A. E. S.

President Sterling presided at the October meeting. Messrs. B. Nadel and H. Hoitling were elected active members. One new application for active membership was received and referred to the Board of Trustees. Mr. F. F. Perdon was reinstated to active membership. Past President T. B. Hoddow exhibited some very interesting deposits of tin. The deposits had all the necessary qualities required of a durable tin deposit. The following problems were discussed at the October meeting: Cobalt nickel plating. Stereotype metal. Nickel solutions for die castings. Rapid nickel solutions. Matt finishing aluminum. Brighteners for zinc solutions, and the cause of blistering in hot copper solutions.

### PHILADELPHIA BRANCH, A. E. S.

The regular monthly meeting was held November 5 at the University of Pennsylvania, with a good attendance. After the regular order of business and the election of three applicants to membership, Mr. Kirkpatrick spoke on barrel plating, showing samples of nickel finishes. Mr. Gehling also spoke on barrel brass plating and the make up of a stock solution he uses. Both subjects were very interesting and closely followed.

### BRASS MANUFACTURERS

The National Association of Brass Manufacturers annual meeting took place at the Hotel Astor, New York City, on Tuesday and Wednesday, December 7 and 8, at which time the report of the Standardization Committee, who have had many important matters in hand, was made. Various matters of very great importance to everyone in the line were discussed, as well as ways

and means for coping with conditions with which the manufacturer will be confronted in the fore part of 1921, were discussed and considered.

The annual election of officers took place.

As the meetings were held while THE METAL INDUSTRY was on the presses, full reports cannot be presented until next month.

### FEDERATED ENGINEERING SOCIETIES

At the convention held November 18, 19 and 20, in the new Willard Hotel, Washington, D. C., thirty-one societies, having a total membership of about 60,000, sent seventy-two delegates. The convention was held by the American Engineering Council, the managing body of the Federated Engineering Societies, and its purpose was to take place to form the nation-wide organization of technical men. The following officers were elected:

President, Herbert Hoover, of the American Institute of Mining and Metallurgical Engineers.

Vice-presidents, Calvert Townley, American Institute of Electrical Engineers; William E. Rolfe, Associated Engineering Societies of St. Louis; Dexter S. Kimball, American Society of Mechanical Engineers; J. Parke Channing, American Institute of Mining and Metallurgical Engineers.

Treasurer, L. W. Wallace, Society of Industrial Engineers.

A meeting of the executive board was held, with William E. Rolfe presiding and Charles F. Scott as temporary secretary. A committee was named to act with President Hoover to find a suitable executive secretary. Among the affairs passed on were the following:

A resolution in favor of the publication in English of critical tables of physical and chemical constants.

Endorsing the plan of President Hoover to investigate industrial waste and the forming of an organization to do this work.

A resolution in favor of helping to establish a department of public works.

A letter was received from the American Society of Civil Engineers stating that by vote of 3,278 to 2,330 it had decided not to become a charter member of the Federated American Engineering Societies. It is possible that this may delay the turning over of the work of the Engineering Council to the Federated Societies, but this has as yet not been determined.

### INDUSTRIAL TRAFFIC LEAGUE

The Fall meeting was held at the Selbach Hotel, Louisville, Ky., September 30-October 1, 1920. Proceedings can be obtained by writing, for Circular No. 296, to J. H. Beck, Executive Secretary, 111 W. Washington Street, Chicago, Ill.

## PERSONALS

### ITEMS OF INDIVIDUAL INTEREST

**Benjamin W. Gilchrist** has been placed in charge of the electroplating department of the Morgan General Ordnance Depot, South Amboy, N. J.

**W. S. Quigley**, president, Quigley Furnace Specialties Company, New York, has just returned from Europe after an extensive trip made in connection with large installations of the Quigley Powdered Coal System in Italy and Belgium.

**H. S. Mulliken**, of Lexington, Mass., has been appointed metallurgical engineer of the Bureau of Mines, and has been assigned by Dr. F. G. Cottrell, the director, as an assistant to him in special professional work connected with the bureau. Mr. Mulliken is a graduate of the Worcester Polytechnic Institute, Worcester, Mass. He has been variously connected with mining and metallurgical enterprises as superintendent of the lead smelter at Pilot Bay, British Columbia; superintendent of the American Smelting and Refining Company, smelters at Aguas Calientes and Monterrey, Mexico; general superintendent and plant manager of the Penoles Companies at Mapimi, Mexico; for six years in charge of the metallurgical operations of the American Metal Company's interests in Mexico; and later was consulting engineer in metallurgy for the same company, with offices at No. 61 Broadway, New York.

**F. C. Ryan**, sales engineer for The New Jersey Zinc Company, has just returned from a trip to South America, where he was sent to investigate conditions pertaining to the use of zinc in Brazil, Argentine and other countries.

**Bushnell Bigelow** and **W. Homer Hendricks**, of The New Jersey Zinc Company, have returned to New York from Canon City, Colorado, where they inspected the Zinc Oxide plant of the Empire Zinc Company, now nearing completion.

**W. I. Hess**, manager of eastern sales for The New Jersey Zinc Company, is back from a week's trip to Eastern Canada.

**George H. Morgan** has been elected treasurer of E. F. Houghton & Company, manufacturers of oils and leathers for the industries, Philadelphia. The position of secretary of the company, formerly held by Mr. Morgan, has been filled by the election by the Board of Directors of **George W. Pressell**, chief of the Houghton research staff. Mr. Morgan will retain the position of managing director of the leather manufacturing department of Houghton & Company.

**E. E. Allyne**, president of Aluminum Manufacturers, Inc., and of its subsidiary, The Aluminum Castings Company, of Cleveland, Ohio, has resigned on account of ill health, and plans to spend the winter in the South. **W. P. King**, formerly vice-president, has been elected president to succeed Mr. Allyne. Mr. King will also be treasurer. **George J. Stanley**

has been made vice-president in charge of production. **John H. Watson, Jr.**, remains secretary.

**O. E. Falls**, who has had many years of experience in charge of foundry and thermit welding work at the Norfolk Navy Yard, Portsmouth, Va., has accepted a position with the Metal & Thermit Corporation, New York. Mr. Falls obtained his earlier foundry experience from positions held at the Norfolk & Western Railway shops, Roanoke, Va.; the Richmond Locomotive Works, Richmond, Va.; Pennsylvania Engineering Works, New Castle, Pa.; the Franklin Air Compressor Works, Franklin, Pa.; the Seaboard Air Line Railway Company's shops, Portsmouth, Va.

At the last mentioned company Mr. Falls began his first thermit welding work. In 1905 he joined the Goldschmidt Thermit Company, then located at 43 Exchange Place, New York. In 1907 Mr. Falls returned to the Norfolk Navy Yard, and for 10 years did all, or supervised, the thermit welding work of that company. This work included some valuable repairs made on battleships, torpedo boats and torpedo boat destroyers. After leaving the Norfolk Navy Yard, in 1917, Mr. Falls became superintendent in the steel foundry of the Bay View Foundry Company, Sandusky, Ohio. He was later appointed superintendent of the steel foundry of the Weatherley Steel Castings Company, Weatherley, Pa., and still later superintendent of the iron and brass foundry of the Gaskins Foundry Company, New Bern, North Carolina. He was superintendent of the iron and brass foundry of the Manning Manufacturing Company, Rutland, Vermont, when he accepted his present position with the Metal & Thermit Corporation.

**Dr. Jessie E. Minor** has resigned her position with the Hamersley Manufacturing Company, Garfield, N. J., to take a place as research chemist for the Emerson Laboratory, Springfield, Mass.

**Brile & Ratner, Inc.**, announce the addition to their sales department of **John N. Brenza**, for several years connected with the sales department of the Aluminum Company of America in the Cleveland and New York districts.

**L. C. Wilson**, for the past two years general sales manager of the Chain Belt Company, Milwaukee, has been elected secretary of the Federal Malleable Company, West Allis, Wisconsin, manufacturers of malleable castings, malleable chain and the Rapid Molding Machine. He is to assume his new duties on November 15th, and will be succeeded as sales manager at the Chain Belt Company by **Clifford F. Messinger**.

Mr. Wilson is a Yale graduate and began his business career as a salesman with Harbison-Walker Refractories Company,



Pittsburgh. In 1917 he became associated with the Chain Belt Company, and until his appointment as sales manager acted in the capacity of assistant to the vice-president. As the Federal Malleable Company is closely associated with the Chain Belt Company, Mr. Wilson will continue to be in touch with Chain Belt friends.

Mr. Messinger is also a Yale graduate, and has been with the Chain Belt Company since 1909 in various capacities, including that of advertising manager, manager of Rex Concrete Mixer sales, and assistant to the vice-president.

**J. C. Sellers, Jr.**, of Aluminum Manufacturers, Inc., Cleveland, Ohio, has been appointed southeastern representative for their Lunite Products, with local headquarters at Merion Station, Pa. In this territory he will handle the sand casting business of the Buffalo and Fairfield plants, also the forging and permanent mold business of the Cleveland plant.

**Joseph P. Sessions**, president of the Sessions Foundry Company, Bristol, Conn., has been elected president of the Bristol (Conn.) Trust Company.

**Hugo Zeller** announces that he has resigned as president, treasurer and general manager of the Egyptian Lacquer Manufacturing Company, having offices at 5 East 40th street, New York City. **Richard Zeller** and **Gustav Zeller**, his brothers, who were also connected with the Egyptian Lacquer Manufacturing Company in the manufacturing end, occupying positions respectively of vice-president, secretary and plant manager; and assistant secretary and assistant plant manager, have also resigned from this concern.

**Wilfred S. McKeon**, of Greensburg, Pa., formerly vice-president and manager of sales of the W. A. Fuller Company, Inc., recently purchased an additional block of stock

in this Pennsylvania corporation to make him the principal stockholder therein, thus giving him control of the manufactory. Mr. McKeon becomes general manager.

The business is founded upon Natrolin, a chemical which they have brought into being and upon which their line of cleansing agents is based. Mr. McKeon is a young man, who identified himself with the plating craft and the metal industry less than two years ago. The W. A. Fuller Company, Inc., are branching out by increasing their sales organization and putting Natrolin metal cleaner in the hands of jobbers, a policy not heretofore followed by them.

**Royal F. Clark** has accepted a position with E. Poeter & Company, Irvington, N. J., manufacturers of ladies' bag and purse frames, as foreman of their gold, silver and nickel plating departments.

**A. L. Taylor** has resigned his position as president of the Riverside Watch Case Company, Riverside, N. J., and the vacancy has been filled by **Frederick Hyatt**, the general sales agent. Mr. Hyatt began at the bottom of the ladder and worked his way up. He has advanced from salesman, and after having had charge of the Philadelphia office, was appointed general sales manager. Mr. Taylor has not outlined his plans for the future.

**John C. Pangborn**, vice-president of the Pangborn Corporation, Hagerstown, Md., manufacturer of sand-blast and allied equipment, sailed on November 27 from New York aboard the Olympic for Southampton. He will spend several months in Europe on business.

**T. C. Eichstaedt** severed his connection on August 14, 1920, with the Morgan General Ordnance Depot, South Amboy, N. J., where he was in charge of the plating department.

## DEATHS

### JOSEPH H. BAIRD

Joseph H. Baird died on Sunday, November 14, 1920, at the home of Judge F. M. Peasley, Cheshire, Conn. He was buried in Oakville, Conn., which has always been his home. He was 92 years 11 months old. He left no relatives except a niece, as his wife, whom he had married in 1853, and his one daughter are dead. He was a member of the Congregational Church. Up to 1913 he was president of the Baird Machine Company. At his own request he retired in favor of a younger man, and acted in an advisory capacity to the last.

Mr. Baird's reputation as an inventor was worldwide. He was the first man in the United States to make pins. He invented many of the machines and methods used throughout the world in making pins, among them the pin sticking machine which puts the pins in papers and which revolutionized the whole pin business from the sales and handling standpoint. He invented the safety pin machine which takes the wire from a coil and drops out complete pins ready for the cleaning or plating operation.

He was the inventor of many of the automatic machines that are used for making every-day products in large quantity. One of his early inventions was the machine that fastened the hoops in hoop skirts. He sold this invention for thirty dollars, and the man who bought it resold the invention for fifty thousand dollars, which was a very large sum in those days.

Mr. Baird was associated with many of the men who developed the manufacturing industries

of New England and was generally recognized as a pioneer in the manufacturing of machines for the automatic production of small wares and notions.

An account of Mr. Baird's career was published in *THE METAL INDUSTRY*, April, 1919.

### ARTHUR E. HAUCK

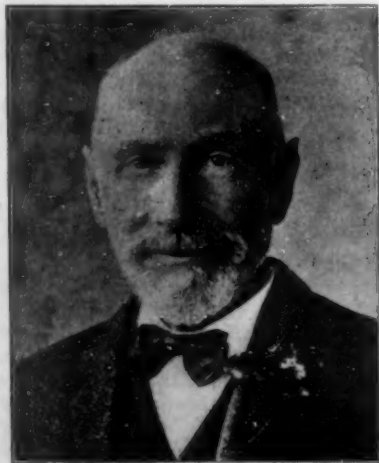
Arthur E. Hauck, president of the Hauck Manufacturing Company, manufacturers of oil burning appliances, kerosene torches, furnaces, forges, Brooklyn, N. Y., died at his Flatbush home, Brooklyn, N. Y., October 30, aged 41.

He began his career by learning coppersmithing in Germany. After learning his trade, he left to follow it in the Navy and shipyards of Belgium, France, and later in England. He arrived in this country when 20 years of age. He had only enough funds left when arriving in Philadelphia to pay for his first night's lodging, but the next day he obtained employment at the Philadelphia Navy Yard.

After working for three years in the Navy coppersmithing shops in Philadelphia, Norfolk, Baltimore and Brooklyn, he started in the oil burner business in 1902 with a small shop in Brooklyn. His pioneer work was the basis for the great bulk of industrial oil burning today. His tireless industry continued with the development of the oil burner business which carried his name. Its consistent growth and development include over a score of important basic patents in burning oil, kerosene, etc., as well as numerous minor inventions and improvements which deal with applications of burning oil for a great many uses.

One of his principal patents is the method of vaporizing kerosene in a torch with proportioned heat resisting nozzle, the form of vaporization reducing carbonization. Another basic patent is the Hauck method of atomization through proportioned pipes and openings and with composition nozzle, and what is termed the internal combustion.

From its inception, Mr. Hauck brought into his business men whom he wished to share his success. In this way he looked ahead and built his business on a firm foundation and insured a continuation of its growth along established policies.



JOSEPH H. BAIRD

## TRADE NEWS

BUSINESS REPORTS OF THE METAL INDUSTRY CORRESPONDENTS

### HARTFORD, CONN.

DECEMBER 1, 1920.

Thomas J. Kelley, secretary of the **Hartford Manufacturers' Association** is of the opinion that extreme uncertainty, with the prospects of further deflation during the winter months, characterizes, at present, the Hartford manufacturing industry, explaining that "everybody knows whereabouts what our Hartford factories are doing at present."

Hartford industries, however, are not all affected in the same degree. The typewriter factories are expanding their output in compliance with increased demands, but industries providing parts for automobiles are hard hit. Asked if there were any omens presaging a general industrial smash-up, **Mr. Kelley** replied that he did not think a possibility of this nature was in the offing, but, on the other hand, he did not think any one could enter a complete denial to the question. The various branches of the industrial world, the raw materials agencies, the manufacturer and the products-selling agencies, have broken their lock-step procedure and neither knows what move the others will be compelled to make because of conditions within itself, nor how far necessary changes may go.

**Mr. Kelley** said that he could not particularize the factories in Hartford as to their relative favorable or unfavorable situation, as it would not be conducive to good feeling under present conditions. Many factory employees upon their release entered upon other forms of manual labor, some apparently going back to the work from which they were drawn by the lure of high wages in the factories engaged in producing war products.

In regard to the future, **Mr. Kelley** had the following to say: "I would answer that there never was a time when it was more hazardous to make a prediction as to how industry is going to behave itself in the next few months than at the present time. Hartford factories are almost daily receiving cancellations. Some are small; others are large."

"But the entire industrial situation throughout the country is one of such absolute uncertainty that it is impossible to say when these cancellations will cease. The situation is one which makes it very difficult for the manufacturer to provide in advance for the contingency of curtailed output."

With the approval of a resolution recently by the water commissioners, "all persons, firms or corporations now having any connections between the city water supply and a source of water supply taken from any other source, whether or not such connections are controlled by automatic devices, such as check valves or by hand-operated mechanisms, such as gate valves or stop cocks, must discontinue all such connections within thirty days." The resolution stipulates, further, that failure to comply may be sufficient cause for the discontinuance of city water service. In the case of persons, firms or corporations now having connections governed by the double check valve mechanism of the so-called factory mutual type, this time limit is extended to July 1.

This ruling by the water board of Hartford affects several manufacturing concerns, in which the check valves are in use. The contention was advanced that these valves are dangerous, and that they might lead to an epidemic, if something went wrong with the mechanism. The resolution ordering their discontinuance was not passed until months of consideration had been given to it, and its final passage was by a vote of five to one. Mayor **Newton C. Brainard** informed the water commissioners that he was in favor of discontinuance of the check valves.

### NEW BRITAIN, CONN.

DECEMBER 1, 1920.

Gloomy indeed, is the immediate industrial outlook in New Britain. Without being unnecessarily pessimistic, it might be stated that possibly at no time in the past decade, cer-

tainly at no time during the past six years, has the industrial situation been as uncertain as at present. One large concern has closed down entirely, several others have cut down materially their working schedules and practically every one is beginning to curtail the number of employees. While there has been no drastic slashing of wages, there is nevertheless a tendency toward retrenchment along these lines.

Probably the worst blow that the local manufacturing industry has suffered within the past few days is the absolute cessation of business at the **Fafnir Bearing Company**. On November 24 this large concern, manufacturers of ball bearings, suspended operations for an indefinite period. That the lay-off may be a lengthy one is indicated by the accompanying statement that "it is hoped" that the concern may be able to resume work about the first of the year, "but this is entirely contingent upon the industrial situation as it affects the automobile industry." That the officials do not expect an overwhelmingly brisk trade, even if the factory does reopen the first of the year, might be deduced from the added statement that it is hoped that these operations may be resumed with a part of the present force of employees.

The first concern to give any outward sign of the industrial depression was the **North & Judd Manufacturing Company**, which has just cut its working schedule from a 55-hour basis to a 40-hour week. This is necessary, the officials say, because of the existing depression. Accompanying this discouraging order, however, was the action of the stockholders in voting to increase the capital stock another million dollars and giving a stock dividend of 25 per cent. The **Traut & Hine Manufacturing Company** has also felt the depression and has followed the example of the **North & Judd Company** in the matter of a reduced working schedule.

Another concern badly crippled is the **New Britain Machine Company**. This once flourishing concern has not only laid off several hundred of its employees, but also has gone on a 45-hour week. Another well known manufacturing concern that is in a bad way is the **Standard Steel and Bearings Company**, a branch of the **Marlin-Rockwell Corporation**. Business at this plant has been suspended for many weeks now and those in official positions say that they have not the slightest idea when it will again be possible to reopen. The **New Departure Company**, a branch of the **General Motors Corporation**, has not escaped either and not only have hundreds of employees been let go, but business has suffered to such an extent that fears for the immediate future are held out.

In every instance, however, the manufacturers are putting forth the hope that the first of the year will see the bottom reached and from then on there will be a gradual resumption of business and conditions will steadily improve.

Dark as the situation may seem, it is nevertheless not yet a panic. The big **American Hardware Corporation**, with its many branches, continues to work its regular schedule; the **Stanley Works** and the **Stanley Rule & Level Company** have not changed and at the **Landers, Frary & Clark** factory many departments are working overtime in order to keep abreast of the holiday orders. This concern has recently added to its many household products a washing machine that is expected to be a very desirable asset.

### TORRINGTON, CONN.

DECEMBER 1, 1920.

The general depression which has affected many industries during the past two months is being felt in Torrington. About 1,000 employees have been laid off in the various shops here, approximately 200 of whom have been assimilated by other industries. The total number of factory workers here is in the neighborhood of 8,000. Several of the plants are working on short time and some departments are working only two or three days a week. The general opinion appears to be, however, that the period of depression is only temporary and that there will be a noticeable improvement early



in the new year. Two Torrington plants—the **Union Hardware** and the **Fitzgerald Manufacturing** companies—are working full time. The **Hendey Machine** and **Torrington Manufacturing** companies are working 55 hours a week. The **Coe Brass Branch** of the **American Brass Company**, is trying to run the greater part of its plant 55 hours a week, but several of the departments are on considerably shorter time. The **Turner & Seymour Manufacturing Company** is on five days, and the **Torrington Company's** plants on five days of eight hours each.

The marriage of **Martin D. Fitzgerald**, vice-president of the **Fitzgerald Manufacturing Company**, Torrington, and **Miss Mary E. Cary**, of Windsor, this state, took place November 25 in Windsor.

**Frederic M. Williams**, compensation commissioner for this district, has handed down an important decision in the case of **Frank Edward Dunne**, of Torrington, covering the question of a factory's liability for injuries received by an employee in repairing a machine other than his own. **Dunne**, who is 16 years of age, was employed by the **Fitzgerald Manufacturing Company** on November 20, 1919. He had left his own machine for the purpose of repairing a foot press operated by a **Mrs. Mark Sohosk**. As he was in the act of putting the belt back on the pulley his right arm became caught in the machinery and was badly mangled, the bone being fractured in three places. The company disclaimed liability under the compensation act on the ground that **Dunne's** injury did not arise out of and in the course of his employment. The company set up the defense that the injury had grown out of his own misconduct. The attorney for **Dunne** claimed that the accident grew out of and in the course of the boy's employment, because on one particular occasion the boy's foreman had asked him to repair the belt on the pulley of the same foot press. **Mrs. Sohosk** testified that she had heard the foreman tell the claimant to put the belt back on the pulley and that many times afterwards when it slipped off, she herself asked the boy to put it back. This, she said, was done with the foreman's knowledge. **Compensation Commissioner Williams** awards the boy \$6.57 per week for 520 weeks. The boy's weekly wage was \$13.67. "Specifically," the commissioner says, "the injury has caused a condition which I find to be permanent, equivalent to 75 per cent. loss of use of the injured arm." The commissioner also directs that the hospital, medical and surgical bills be paid by the **Fitzgerald Company**, which is protected by insurance in the **Manufacturers' Liability Insurance Company** of New Jersey.

A new dam is being constructed at the old mill pond of the **Coe Brass Branch** of the **American Brass Company**.

**Wadsworth Doster**, a director and assistant secretary of the **Torrington Manufacturing Company**, is to leave Torrington about January 1 to become manager of a newly organized machine company in Philadelphia. He has been with the **Torrington Manufacturing Company** for ten years and rose to the position of treasurer from a clerkship. He gave up his post as treasurer to enter the army as second lieutenant in the field artillery. At the close of the war he returned to the company. Before entering the army he was prominently identified with various war activities and liberty loan drives and has been active in many community enterprises. He is vice commander of the **Connecticut American Legion**, an officer of the **Torrington Legion**, a member of the **Boy Scout Council** and is affiliated with a score of other organizations. His departure from Torrington will be a distinct loss to the community. His family will remain here probably until spring and will then join him in Philadelphia.

**Francis H. Griffiths**, treasurer of the **Turner & Seymour Manufacturing Company**, has the deep sympathy of his many friends in the metal industry for the death of his three-year-old son, **Francis H. Griffiths, Jr.**, who succumbed on November 17 after a brief illness with scarlet fever and diphtheria.

## INDIANAPOLIS, IND.

DECEMBER 1, 1920.

The trade here will be considerably affected by a recent intrastate increase in freight rates, amounting to about 33½

per cent. The increase was granted by the **Indiana Public Service Commission** after the steam roads had petitioned for an increase of 40 per cent. Because of the fact that **Indianapolis** is a big distributing point for the greater portion of **Indiana**, the distributing houses of **Indianapolis** have been greatly affected. Some of the industries through appealing to the commission saved themselves much added expense when in cases like the brick manufacturers, no increase was allowed and the sand and gravel industry intrastate rates were increased only 11 per cent.

The **Rice Improved Valve and Manufacturing Company** is the name of a newly organized company here that plans to manufacture a newly patented valve. The company is capitalized at \$100,000 and plans the construction of a plant, to include adequate foundries for manufacturing purposes. The directors of the company are **Reece Rice**, **Albert Wenner** and **C. R. Reynolds**.

Articles of incorporation have been filed here by the **Alexandria Metal Products Company**, a newly organized concern formed for the purpose of doing a general foundry business. The company has \$75,000 in capital behind it and the directors are **J. W. Joseph**, **Henry Abrams** and **P. H. Frey**.

Work has been started on a one-story brick foundry building for the **Acme Works, Inc.**, of **Indianapolis, Ind.**, adjoining on the south the present factory building at the **Pennsylvania tracks** and **Harding avenue**. The new building will cost \$27,000 and will be ready for occupancy by March, according to present plans. The concern manufactures aluminum castings, chiefly for automobiles. When the new building is completed the old building will be used as a cleaning department.

Work has been started on a two-story brick warehouse on **Madison avenue**, this city, for **Henry Marks Sons**, metal dealers. The company will make use of an old brick building now on the site which will be used in the construction of the new warehouse. The new building and its equipment will cost approximately \$40,000.

**Walter T. McNamara**, of the firm of **McNamara-Koster Company**, foundry, went down under the Republican avalanche at the last general election to defeat. He was a candidate on the Democratic ticket for representative to the state legislature from **Marion County**.

The trade here is considerably interested in the proposed **Great Lakes-Tidewater** route, a route that will connect the great lakes directly with ocean traffic. At a recent hearing held here before the joint commission which will make a report to the **Canadian and United States governments** the **Indiana Manufacturers' Association**, which is composed of manufacturers all over the state, went on record as favoring the project. The metal industry is well represented in the state organization and has considerable to say concerning its activities. Many men in the trade here believe that such a route would give them every advantage they could ask for developing an export trade.

One metal man, who already has broken into the export end of the business, declared that it cost him as much to get his goods from the warehouse at tidewater to the ship as it did to transport the goods from **Indianapolis** to tidewater.

## TRENTON, N. J.

DECEMBER 1, 1920.

The employees of the various metal plants in **Trenton** as well as in other parts of **New Jersey** will be given a chance to decide on whether they want to adopt the daylight saving plan during the summer of each year. **Warren C. King**, president of the **Manufacturers' Council of New Jersey**, has sent out a questionnaire to more than 2,000 manufacturers seeking to find out if daylight saving is popular with employees.

**William G. Wherry**, president of the **Skillman Hardware Manufacturing Company**, **Trenton**, and **Mrs. Wherry** are home from a trip to **Pittsburgh** and **Detroit**. While in the West **Mr. Wherry** secured a number of contracts for his hardware plant.

**Robert T. Bowman**, a member of the firm of the **Jordan L. Mott Company**, **Trenton**, and **Miss Anne Perrine**, of **Tren-**

ton, have issued invitations for their wedding. **Miss Perrine** is a granddaughter of the late **Ferdinand W. Roebling**, who was head of the **John A. Roebling's Sons Company**.

The **Trenton Emblem Company** had a very attractive float and exhibit in the recent political parade held at Trenton. The company displayed on the float the various kinds of metal products it manufactures and the float attracted considerable attention. A number of other concerns also had floats.

The **Gloria Motor Corporation**, incorporated under the laws of Delaware, has purchased the plant of the **Artcraft Company**, at Washington, N. J. The motor company also has an option on a two-acre tract adjoining the factory. The factory will be placed in repair and the new company will manufacture automobile motors. Eventually a large factory will be erected. The officers of the incorporation are: President, **A. M. Maini**, of Philadelphia; first vice-president and chief engineer, **Oliver C. Irwin**, of New York; second vice-president and automobile engineer, **Charles M. Rose**, of New York; secretary, **J. Stuart Freeman**, of Philadelphia; treasurer, **Frank Todd**, of Philadelphia.

The **Monmouth Metal Company**, of Matawan, N. J., has been organized by **William T. Van Alstyle** and **William A. Smith** to manufacture brass, copper and other metal products. It is understood that the new company will later erect a manufacturing plant.

The **Cobro Manufacturing Company**, of Vineland, N. J., has been incorporated at Trenton, N. J., with a capital stock of \$150,000 to manufacture talking machines, parts, etc. The incorporators are **G. E. Matteson**, **D. S. Cohen** and **Louis M. Sanders**.

The **Abrasive Machine and Supply Company**, 221 Halsey street, Newark, has leased a plant for a new works. The **Interstate Metal and Refining Company**, 29 Commercial street, Newark, will erect a one-story metal working shop to cost about \$15,000. The **Bayway Smelting and Refining Company**, Elizabeth, N. J., will erect an addition to the plant to cost \$20,000. The **LeCompete Company**, automobile hardware, is erecting a two-story building, 75 by 140 feet.

Former Senator **W. Edwin Florance**, of New Brunswick, N. J., has been appointed receiver for the **Eastern Foundry Company**, Jamesburg, N. J., by vice-Chancellor Fielder. It is alleged that the liabilities of the company are \$25,000 and that the assets will not reach more than \$20,000.

The officials of the **Balbach Smelting and Refining Company**, Newark, N. J., recently tendered a dinner to 100 employees at the Robert Treat Hotel, Newark. The office force, shop foremen and superintendents were present. Frequent shop meetings have been held, at which prizes were awarded for suggestions made by employees. **William I. Cooper**, a director of the Balbach company, was toastmaster. Vice-President **Julian B. Beatty**, Secretary **Franz Schmutzer**, General Superintendent **Emil E. Dieffenbach** were guests.

**Associated Lamp Company**, Newark, N. J., has been incorporated at Trenton, N. J., with \$125,000 capital to manufacture and deal in electrical equipment. The incorporators are **Joseph I. Kaplan**, **Joseph E. Cohen**, of Newark, and **Edward P. Hackel**, of New Orleans.

**Ajax Battery Company**, of Passaic, N. J., has been incorporated at Trenton, with \$500,000 capital to deal in storage batteries. The incorporators are **Delois C. Gibson**, **Joseph H. Lefferts** and **Richard Baker**, all of Garfield, N. J.

**International Incandescent Lamp Works**, of Union, N. J., has been incorporated at Trenton, with \$100,000 capital stock to manufacture electric lamps and appliances. The incorporators are **Conrad Schickerling**, **Albert W. Schaad** and **Lillie E. Schickerling**.

**Boulevard Automobile Corporation**, of Jersey City, N. J., has been incorporated at Trenton, with \$200,000 capital to manufacture automobiles. **A. J. Wegner**, of Jersey City; **W. C. Weber**, of New York, and **D. L. Decker**, of Teaneck, N. J., are the incorporators.

**Failer-Martin Corporation**, of Bloomfield, N. J., has been chartered at Trenton, with \$100,000 capital to manufacture hardware and cutlery. The incorporators are **Arthur S. Martin**, **Thomas S. Sadler** and **Theresa L. Hershendorf**, of Newark, N. J.

The **Simmons Hardware Company** is conducting an ad-

vertising campaign by distributing literature from a big Curtiss bi-plane. The machine, which is making a tour of the southern and eastern states, is piloted by **Lieutenant A. M. Alcorn**, a member of the **British Royal Flying Corps**. While in Trenton **Lieutenant Alcorn** made his headquarters at the **Brooks Hardware Company**.

## ROCHESTER, N. Y.

DECEMBER 1, 1920.

Business conditions in Rochester's manufacturing establishments have become so slack of late, owing to cancellations and a lack of orders, that purchasing agents are buying metals only in quantities absolutely required. It is estimated that between 18,000 and 20,000 men are out of employment in this city, but not all of them are employed in metal-using plants.

Many men are said to be idle that were recently employed by the **Bausch & Lomb Optical Company**, the **Eastman Kodak Company**, the **General Railway Signal Company**, the **North-East Company**, and all of the various machine shops. It is said that one-half of the force in a big machine shop on the east side of the city has been laid off within the past week.

Extension of the **General Railway Company's** interests in this city by the purchase of the former plant of the **Symington Forge Company** in University avenue, Brighton, is said to be in contemplation.

**F. A. Haughton**, of 331 Seneca Parkway, general manager of the Rochester plant of the **General Electric Company**, has been out of the city. It is suggested that negotiations are being conducted to acquire all of the **Symington** plants in this city, including the cannon plant in University avenue. Plants A and B of the **Symington** interests have been acquired by the **General Electric Company**. Plant A is located in Leighton avenue at Crouch street. Plant B is at Leighton avenue and Greenleaf street.

The **Rochester Association of Purchasing Agents**, through its president, **H. Bucklin**, of the **Todd Protectograph Company**, has denied that the **National Association of Purchasing Agents** had instituted a strike or that the organization was conducting a campaign to eliminate the jobber.

"The buyers' strike report is absurd," said **Mr. Bucklin** today. "The proof of its absurdity is the fact that purchasing agents are generally employees, not owners, merely acting as agents for purchasers. Nor is the **National Association** making any attempt to eliminate the jobber. There is an organized movement, however, to do away with those brokers or middlemen who, operating between the right source of supply and the buyer who makes his purchases for use, render no service for the commission they receive. In other words, the purchasing agents do not care to pay men for doing nothing."

## DETROIT, MICH.

DECEMBER 1, 1920.

It is exceedingly difficult to maintain an optimistic spirit when business conditions are such as they are today, but that is just what is being done by most of the automobile manufacturers and those engaged in producing accessories. Take the **Ford**, for instance. At the present time this plant is working 50,000 men five days of the week. The high labor peak is 55,000, or was just before the depression took hold of this section. In this way the **Ford** company is keeping its great organization intact, and ready to tackle the production demands that are expected within the next few months. Other plants are run in the same way. Instead of cutting their forces they are cutting the number of work days, and in this way everyone is given a chance. Of course, this has been a good opportunity to get rid of untrained workmen, and these were the ones first to go. Thousands of them are out of work today. Many are leaving the city, largely for the rural sections from whence they came when the demand for labor became so insistent a year or more ago.

The brass, copper and aluminum industry depends largely on the automobile industry, and, of course, when the latter slows there is a general slowing up all along the line. But every-



one is optimistic, and a general revival of the automobile industry is expected directly after the new year comes in. It has been that way in former years, and there is every reason to believe it will come again. In the early years of the industry, it was the usual thing for the plants to close for six or eight weeks during the winter months, and then as soon as the new year broke and the automobile shows were over, the business would boom. That, of course, was before the war, but there is every reason to believe it will work the same within the next two or three months.

There is no getting around the fact that business has come to a standstill. But no one seems to be suffering, and those out of work are making the best of the situation.

## COLUMBUS, OHIO

DECEMBER 1, 1920.

With a curtailment of buying on the part of all metal using concerns, the trade in Columbus and central Ohio territory rules rather quiet. Business is reduced to a point where buyers are only looking for immediate requirements and are not disposed to stock up for the future. It is now a strictly hand-to-mouth proposition and will probably continue that way until after the first of the year. At least all metal using concerns and dealers are looking for no large increase in orders until after the New Year, when inventories have been completed and the year's business cast up.

The election with its uncertainty is over and a beneficial effect is visible in many ways. There is less disposition to curtail the output of certain plants and that is being reflected on the trade as a whole. Shipping of all metals is more prompt than formerly and now there is little trouble over a car shortage. Collections show signs of improvement.

Papers have been filed increasing the authorized capital of the **Superior Metal Products Company**, of Elyria, Ohio, from \$75,000 to \$200,000.

The **Acklin Stamping Company**, of Toledo, has purchased a site and will soon start the erection of a plant. Papers were filed with the secretary of state increasing the capital from \$50,000 to \$500,000. It is planned to employ 750 men when the factory is completed.

The capital of the **Lake Erie Metals Company**, of Cleveland, has been increased from \$20,000 to \$50,000.

The **Light Alloys Company**, of Painesville, Ohio, has established a sales office in Cleveland.

The **Metal Production Company**, of Vermillion, Ohio, has been chartered with a capital of \$10,000 by M. F. Ranney, A. B. Kimpflin, F. B. Ranney, A. J. Abrahamesek and A. J. Kimpflin.

The **Miami Aluminum Ware Co.**, of Dayton, has been incorporated with a capital of \$10,000 by Carl Wilcke, Arthur S. Fraas, Fred Wilcke, Jr., Cora E. Wilcke and Anna L. Noxon.

The capital of the **Brookside Brass Foundry Company**, of Cleveland, has been increased from \$20,000 to \$60,000.

The capital of the **Standard Stamping Company**, of Marysville, Ohio, has been increased from \$200,000 to \$300,000.

## CLEVELAND, OHIO

DECEMBER 1, 1920.

General Conservatism appears to be in charge of the business drive in the northern Ohio salient as the last lap of 1920 starts. While there is not the deflation of business activity in industrial lines that some would lead others to believe, certainly the pep is not there and is not expected to be this side of the prohibition New Year's Day. Thus a decided contrast to conditions six months, or even three months ago must be noted in nearly every line of activity in which the metal industry itself figures.

The long-expected readjustment period is here therefore and being gone through with philosophically. Big business as a whole places the solution upon labor, for it is claimed that labor alone, both going into materials and shaping them into finished product, must come to a normal basis before a normal condition in general can be attained.

Whether this consideration is having influence or not, it

must also be admitted that the **American Plan Association of Cleveland**, with its declaration to bar no workmen from plants, whether members of unions or not, has completed its organization here with 70 per cent of plant owners in its membership. This membership gives employment to 85 per cent of the working men in the Cleveland district.

In completing its organization and announcing its plan, the association comes out flatly in declaring that it is not opposed to unions or organized labor. Its main object is to place Cleveland on the open shop basis, as against the closed shop in the past, leaders assert. Moreover, the association is opposed to any lowering of wages until material reduction in living costs has been attained. Relief from under-production will be one of the prime aims of the association. Through observation of these and similar principles it is expected industrial peace and prosperity for the district will obtain. **F. C. Chandler**, of the **Chandler Motor Car Company**, is president of the new organization.

Refinancing of the **Standard Parts Company**, one of the biggest industries in this section of the country, has been completed. The company starts off with close to \$12,000,000 working funds. New board of directors includes: **Fred H. Goff**, Cleveland Trust Company; **Frank Scott**, the **Warner & Swasey Company**; **John Sherwin**, First National Bank; **W. E. Black**, Toledo; **E. J. Hess**, Cincinnati; **F. R. White**, A. W. Hahn, F. G. Smith, W. D. Sayle, **Dudley Blossom**, W. L. Day, H. P. McIntosh, J. O. Eaton, F. F. Prentiss.

The company has in excess of \$16,000,000 business on books, according to **John Younger**, vice-president and assistant general manager. Principal difficulties of the company, according to **Mr. Younger**, have emanated from the steel strike, the coal strike and the switchmen's strike, followed by the reduction in buying after the Ford price cut last September. On the other hand, and this offers greater output for the company's production, it is asserted that demand for motor trucks is greater than ever. Backed by the present business booked, it is claimed by leaders of the enterprise that next March will see the company in stronger position than ever.

Extension of its activities in this section is announced by the **E. W. Bliss Company, Inc.**, Brooklyn, N. Y., in acquisition of the plant, now under construction, of the **Cleveland Machine and Manufacturing Company**, and equipment of the same company's plant already operating. The **Bliss** concern recently acquired the plant of the **Buckeye Engine Company**, Salem, Ohio, and that of the **Consolidated Press & Machinery Company**, Hastings, Mich. In addition it controls the two large plants covering several city blocks in Brooklyn, N. Y. The newest plant acquired, in the eastern end of Cleveland, is expected to be ready for operation next spring.

Cleveland gear makers were well represented at the **American Gear Manufacturers' Association** convention at Lake Mohonk, N. Y. Among those who sent representatives were the **Grant-Lees Gear Company**, **Horsburgh & Scott Company**, **Stahl Gear & Machine Company**, **Taylor Machine Company**, **Lees-Bradnor Company**, **F. H. Bultman Company**, **Sawyer Gear & Manufacturing Company**, **Van Dorn & Dutton Company**. **F. W. Sinram**, president of the last named firm, is president of the association.

Latest victim of Saturday payroll bandits is the **Republic Brass Company**, losing more than \$5,000. **Edward Blywise**, manager of the company, and **Julius Pollock**, secretary-treasurer, were held up on a stairway leading to the offices as they returned from the Guardian Bank with the funds. Two men seized the bag, emptied the money into their pockets, threw the bag at the company officers, and ran to shelter in an ice house, where they disappeared. Revolvers were used to intimidate **Mr. Pollock** and **Mr. Blywise**.

Average wage reduction of 15 per cent has been made by the **General Phonograph Company** at its Elyria plant, affecting 900 workers. Reduction in manufacturing demand in the immediate Elyria district has put 1,900 persons out of employment.

New opportunity for metal industry operators is seen in the decision of the **Northern Ohio Traction Company** to use metal tickets on its local street car lines in Canton and Massillon. The early use of the new tickets shows them to be good substitutes for paper.

## LOUISVILLE, KY.

DECEMBER 1, 1920.

Although industrial business has slumped off badly in many lines, the coppersmiths, that is the sheet metal working concerns, of Louisville, report very fair business. Casting demand is light, and the casting foundries are not at all busy, but the sheet metal plants seem to have a very fair volume, consisting largely of vacuum pans for use in food product plants of one kind or another, milk evaporating plants, etc. There is also some little demand for alcohol distillery work.

The entire plant of the **Hart Manufacturing Company**, Louisville, manufacturers of sheet metal principally, but doing some casting work, using steel, brass, copper, etc., was burned on November 27, the blaze getting a good start, and doing damage estimated at \$35,000. During the war period the company was chiefly busy on field ovens and Government work. It was brought to Louisville from the North a few years ago, and has done well. It is reported that the plant will be rebuilt.

**C. E. Willey**, Louisville, has purchased land for a new plant to manufacture portable drills and electric tools of one kind or another, and a \$100,000 company is being formed to handle the business.

**Galvin Brothers Steel Wool Company**, Louisville, capital \$24,000, has been chartered by J. L. Heffernan, S. H. Nichols and Fred E. Galvin.

**W. F. Boone** affirms ownership of the **Boone Sheet Metal Works**, 1951 West Walnut street, Louisville.

The **Stimson Computing Scale Company**, manufacturers and assemblers of weighing devices at Louisville, has increased its liability limit to \$600,000. Its capital is \$535,000.

## PROVIDENCE, R. I.

DECEMBER 1, 1920.

Further curtailment of production, together with reduction of working forces and schedules, have been generally in evidence among all lines of industrial activity throughout Rhode Island during the past month. The result is that the close of the month of November finds more workmen out of employment than has been the case since previous to the outbreak of the great world war in the summer of 1914.

While the curtailment among the textile plants of the State has been the most noticeable, all the metal branches have been materially affected and in the aggregate the effect has been very substantial, both to the employer as well as the employee.

Although manufacturers of all lines of business are optimistic for the future, they admit that they can see no opportunity for a return to anything approaching normal conditions for some time to come. All are agreed, however, that they have expectations that immediately following the beginning of the New Year there may be a tendency toward a healthy and consistent improvement.

Among the largest of the plants identified with the metal branches that have taken steps for curtailing their production are the **Brown & Sharpe Manufacturing Company**, the **Gorham Manufacturing Company** and the **Ostby & Barton Company**. The **Brown & Sharpe Company** manufactures small tools of all kinds as well as high grade micrometers, measuring instruments, etc., furnishing employment to more than 3,500 employees. The **Gorhams** employ about 2,000 workmen in the manufacture of every description of silverware—flat, hollow and novelties—while the **Ostby & Barton Company** is one of the largest producers of finger rings and jewelry in the world, with nearly 2,300 on the regular pay-rolls.

Both at wholesale and retail the jewelry trade is marking time at the moment, and this, necessarily, causes all the co-ordinate branches to be affected. Most of the retailers, particularly those from the large centers, have completed their holiday buying, which leaves the manufacturers in a sort of "hay and grass" state. The general public not yet having started its Christmas gift buying, and the holiday being too close to permit much duplication of orders, the retailers are

not yet much overburdened. Although the representative manufacturers frankly admit that the business done in the past few months is behind that of last year, they further assert that it exceeds that for 1918 and of several preceding years. Last year marked the height of the "boom" period.

Action is disapproved of the compulsory adoption of the metric system of weights and measures, as proposed by the **World Metric Standardization Council**, which has its headquarters in San Francisco, has been formally taken by the **Providence Chamber of Commerce** board of directors. The general secretary of the Providence chamber has been instructed to notify the Rhode Island senators and representatives in Congress to this effect, and to write to various national organizations, voicing the chamber's opposition.

This stand was taken by the chamber upon the recommendation of its industrial development committee, of which **William T. Murphy** is chairman, and is in line with similar action said to have been taken by the chambers of commerce of other large cities in different sections of the country. The American Institute of Weights and Measures, with headquarters in New York City, with which certain Rhode Island manufacturers are identified, is also conducting a campaign against the proposed adoption of the metric system.

The annual social meeting and banquet of the **Providence Attleboro Branch of the American Electroplaters' Society** will be held in the parlors of the Narragansett Hotel, Providence, on Saturday evening, December 11, and invitations have been extended to manufacturing jewelers and their platers and colorers to attend. Two able speakers familiar with the electroplating industry will make addresses and the executive committee has arranged a number of interesting and novel features. An informal reception will precede the banquet, which will be held at 6.30 o'clock.

**Hamilton & Hamilton, Jr.**, have recently incorporated under the laws of Rhode Island under the firm style of **Hamilton & Hamilton, Jr., Inc.**, and has organized with **Ralph S. Hamilton** as president and treasurer; his son, **Ralph S. Hamilton, Jr.**, as assistant treasurer, and his brother, **Robert M. Hamilton**, as secretary. The concern is celebrating its fiftieth anniversary this year as a manufacturing jewelry concern.

A concern which will buy, sell and deal in metals of all kinds, and will manufacture, buy, sell and deal generally in machinery has been granted a charter under the laws of Rhode Island by Secretary of State Parker. Headquarters will be maintained in this city, and the capital stock consists of 120 shares of no par value. The incorporators are **Frank L. Reilly** and **B. G. Hackett**, of this city, and **Thomas R. Kilkenny**, formerly a manufacturing jeweler of this city, but now in mining interests in Yuma, Ariz. The firm will be known as the **Hackett Products Company, Inc.**

The three-story brick building extending from West Exchange street to Aborn street, known as the "**Cove Street Machine Shop**," has been purchased by **Eugene A. Eddy**, of the **E. A. Eddy Machinery Company**. The building is 170 feet long and 45 feet wide and is assessed at \$33,346.

## MONTREAL, CANADA

DECEMBER 1, 1920.

The closing months of this year finds the non-ferrous metal industries catching up on their orders and as far as new business and inquiries would indicate, the outlook at this time does not seem very promising. Practically all the brass foundries and shops engaged in specialty work, hardware manufacture, valves and fittings, lighting fixtures and chandelier making have had a favorable year of business.

The indications are that after the first of January the demand for brass goods will again be back at normal. Builders of certain lines of machinery are busy, particularly cotton and wool mills, and more especially the pulp and paper mills, which are large users of brass goods and steam specialties.

As Canada is now the largest producer of pulp and paper in the world, and the developments of their production has been enormous this year, they are to become large users of brass castings in the future.



The **Arnold & Taylor Engineering Company**, located on Oiler street, are rebuilding their brass foundry, which was recently destroyed by fire, and installing the latest equipment for melting and handling their metals.

The **Canada Brass Company**, located at 138 Craig street, are running to their full capacity and making a specialty on lighting fixtures.

## BIRMINGHAM, ENG.

NOVEMBER 15, 1920.

Short time is being worked in all the metal trades this week, and, although the end of the coal strike appears to be in sight, it will be two or three weeks before normal conditions will begin to return. Coal supplies have been placed under strict Government control. Some firms have good stocks of fuel, but they are compelled to restrict their consumption to 50 per cent of the normal average. A similar restriction has been placed upon the use of gas for industrial purposes, but some difficulty has been found in enforcing it. So far there has been no stoppage of any important firm in the non-ferrous metal trades. The iron and steel works have suffered most severely from the shortage of fuel, their consumption of which in proportion to production of material is relatively very high. In making a ton of pig-iron the coal used amounts to between two and three tons, while in producing finished iron and steel the ratio is also high. As deliveries of coal have for a long time past been deficient the strike has meant the closing of most of the large iron and steel works and the damping down of all but one or two blast furnaces in every district. Shipbuilders, however, have been able to carry on up to the present, as, owing to transport congestion, large stocks of steel materials lying near at hand awaiting delivery to other districts, have been at their disposal.

Materials for the non-ferrous metal industries have been in good supply. Government disposals have played havoc with the scrap market.

### BRASS FOUNDRY AND TRADE CONDITIONS

Up to the present time, brass foundries have been well employed, but there is comparatively little forward business to take the place of the orders upon which they have been working. Cancellation of orders has increased during the coal crisis. Home demands have fallen off and foreign buyers are deterred by the impossibility under present British conditions as to labor and other costs, of obtaining firm quotations. There are, however, some encouraging symptoms. In Australia, Japanese competition has proved ineffective. Experience of Japanese productions and business methods has strengthened the preference for British brass foundry, and some good orders have been received recently in Birmingham from Australia. South Africa is showing a similar tendency, whilst Sweden still shows a partiality for British brass ware. But for exchange difficulties a good share of the old business with European countries, which in the past have always been large buyers of the better class of brass foundry products made here, would have been by this time recovered. The Germans are endeavoring to take advantage of these conditions of British home difficulties to secure the trade of the Continent, and have even to some extent invaded the British home market, but quotations are more easy to obtain from them than deliveries. Rollers and tube drawers have plenty of work on hand. By a series of small reductions the standard price of heavy copper sheets has fallen to £156 (\$543.07) per ton, and there have been corresponding reductions in other copper materials as well as in brass, sheets, rods, wire, tubes, etc.

### COAL SITUATION

The coal situation for the moment is hopeful. A settlement was reached on Thursday, but its acceptance depends upon a ballot of the miners next week. The original notices fixed the general strike for the end of September. On the advice of their leaders the miners—many of them rather reluctantly—agreed to postpone action to allow of further negotiations with the Government. As the result of repeated conferences in which Mr. Lloyd George and Sir Robert Horne (president of the Board of Trade) and the executive of the Miners' Federation, took part, a scheme was evolved by which increases of wages were to be regulated by excess of production above a given datum line. This, it was stated, would give the miners at once the additional 2s. per shift they were demanding if within a short period production was restored to the level of that of the early months of this year, and might result in further increases of wages if the upward movement in output were maintained. The scheme was submitted to a ballot of the miners and was rejected by an overwhelming majority. This decision was interpreted by the leaders as reaffirming the decision to strike for the unconditional increase of 2s.

Instructions were sent out which resulted in a cessation of work on October 16. For the moment a fight to a finish seemed to be threatened. The Government, however, let it be known that every avenue to a friendly settlement would be explored and the miners' leaders intimated that efforts at conciliation would be welcome. Informal conversations were opened with a view to ascertaining whether a mutually acceptable basis for a formal conference could be arrived at. While these were proceeding the National Union of Railwaymen butted in without invitation and endangered the situation. Its executive gave orders for a general strike on the railways to take place on Sunday, October 24, in support of the miners' full demand, but the other great organization of the railwaymen, the Enginemen and Firemen's Union, decided to defer until the beginning of the week the consideration of similar action. At the request of the Miners' Executive, supported by representatives of other trade unions, the National Union of Railwaymen suspended its strike notices.

The conference between the Government and the miners' representatives, was formally resumed on Sunday last, and, though, it is said, several times on the point of breaking off, came to an agreement on Thursday (October 28).

The miners are to get their advance of 2s. per shift with 1s. to persons under 18 years of age and 9d. to persons under 16. This means to the adult collier 10s. a week from the date of the resumption of work. The maintenance of the advance is to depend on an increase in the weekly average of the proceeds of export coal upon the rate prevailing during the third quarter of this year. If the rate is only equalled the advance will be reduced by half, whilst 6d. per shift will be added for every complete £288,000 of excess over that figure. The settlement, to which the assent of the coal owners has been obtained, is provisional, pending the appointment, not later than March 31, of a Joint Wages Board to regulate in future the wages of coal miners in relation to the profits of the industry. The most gratifying clause in the terms is the preamble in which the Mining Association (representing the coal owners) and the Miners' Federation jointly pledge themselves that they will "co-operate to the fullest extent to obtain increased output, and, for this purpose, will arrange to set up district committees and national committees." The claim of the Government that wages must depend upon output therefrom has been conceded. A prominent labor leader prophesies that the scheme, if accepted by the miners, will ensure peace in the coal mining industry for at least ten years.

## VERIFIED NEWS OF THE METAL INDUSTRY GATHERED FROM SCATTERED SOURCES

The **Syracuse Supply Company**, Syracuse, N. Y., with branch offices at 99 W. Genesee street, Buffalo, N. Y., and 308 Arlington building, Rochester, N. Y., have been appointed selling agents for New York State for the **Milton Manufacturing Company**, Syracuse, N. Y., makers of buffs.

The **Birmingham Iron Foundry**, Derby, Conn., have bought the business of the **Miner & Peck Manufacturing Company**, for many years builders of drop presses. The business will be operated under the name of **Miner & Peck Manufacturing Company**, but will be located in Derby, Conn. **George W.**

**Peck**, for many years connected with this business, will still be in charge.

**Taylor & Arnold Engineering Company**, 39 Olier street, Montreal, Canada, plans to build a brass foundry and install equipment in same, in the spring of 1921.

The **Falls Rivet Company**, of Kent, Ohio, has just purchased from the **Ohio Wire Goods Manufacturing Company**, of Akron, Ohio, all the machinery, patents and patterns relating to the manufacturing of cotter pins and flat spring keys. The machinery has been moved from Akron to Kent

and is now in operation. The Ohio Wire Goods Company will discontinue the manufacturing of these articles and the event marks an era of expansion in the business of the Falls Rivet Company, who will add to their established product of rivets, bolts and nuts. It will be of interest to those who have been using the Ohio Wire Goods Company as their source of supply for these articles to know that Mr. Lawrence Kneifel and other employees of the organization at Akron, associated with the cotter end of the business, will become associated with the Falls Rivet Company.

The Metal and Thermit Corporation, New York, in order to take care of its rapidly increasing business in the New England territory, has opened a branch office at 141 Milk street, Boston. Inquiries addressed there will have the personal attention of the New England district manager, Robert L. Browns. Orders, however, should continue to be addressed to the general office of this company at 120 Broadway, New York.

David Belais, metallurgist, 13 Dutch street, New York, proposes to put up a three-story building at 137 West Fourteenth street, suitable for the business of the recognized standard in white gold and which now requires larger quarters than he now has at his present place.

The McKenna Brass and Manufacturing Company, First and Ross streets, Pittsburgh, manufacturers of automatic bottling machinery, etc., have recently acquired the plant and business of the Joseph F. Haller Company, Chartiers and Cliff streets, manufacturers of similar machinery, which it will operate as a branch works. They operate a brass, bronze and aluminum foundry, brass machine shop, tool room, and plating and lacquering departments.

The Draper Manufacturing Company, Port Huron, Mich., has increased its capital to \$40,000. They manufacture steel and brass balls, etc. They operate a brass and bronze foundry, brass machine shop and tool room.

The Superior Brass Manufacturing Company, Mansfield, Ohio, is building an addition to its brass foundry, 40 x 60 feet. They have a brass and aluminum foundry, brass machine shop, tool room, grinding room and plating and polishing departments.

Wood-Embley Brass Company, Waynesboro, Pa., intends to enlarge its building in the near future and plans to purchase an additional site to facilitate loading and unloading of raw and finished material. Bronze bushings, aluminum patterns and bronze and aluminum castings are manufactured. President, C. J. Huff, vice-president, J. J. Schmidt, and secretary-treasurer, D. E. Kauffman. This concern runs a brass, bronze and aluminum foundry.

Star Foundry Company, Evansville, Ind., was incorporated recently with a capital stock of \$150,000, to engage in the manufacture of copper and iron castings, wood patterns, aluminum match plates and hollowware, by William J. Abigt, Edward Kiechle and F. L. Stoltz. They operate an aluminum foundry and casting shop.

The Chatham Die Casting Company, 138 Mott street, New York, manufacturers of die castings and other metal products, has increased its capital from \$75,000 to \$200,000. They have a smelting and refining department, aluminum foundry, tool room, grinding room, casting shop, and polishing department.

The Alemite Die Casting & Manufacturing Company, 34 West Chicago avenue, Chicago, Ill., has awarded the contract for the construction of a one-story, 150 x 272-foot building, at 2640 Belmont avenue, to C. B. Johnson & Sons, 111 West Washington street. Estimated cost \$150,000. Equipment costing \$200,000 will be installed in same. They operate a tool room and casting shop.

The Northern Aluminum Company, Sterling road, Toronto, Canada, has awarded the contract for the construction of a plate mill there. Estimated cost, \$200,000. This work is held up due to winter weather and will probably go on as soon as spring comes. This concern operates an aluminum foundry, tool room, spinning, stamping and rolling mill departments.

The Clark Castor Company, Plainville, Conn., have sold

their plant to H. C. Baun & Co., who will operate the plant for electroplating and buffing.

The Electric Furnace Company, Alliance, Ohio, has just shipped two 105 K. W. Baily units to Norway, where they will be used to melt zinc at the Jossingfyord plant in Stavanger, and to melt aluminum at the Norsk Aluminum Works at Christiania.

Complete rolling mill brass melting furnaces, designed for pouring the metal directly into the molds, have recently been shipped by this company to the Amsinck Corporation of Mexico, Mitsui & Company of Japan, and Allen Everett, Ltd., of England. The adoption of electric melting by the largest and oldest brass tube mill in England is especially significant at this time. The Amsinck Company already had a Baily tilting furnace for melting their brass cartridge slab. Both furnaces are for the Mexican government arsenal. In addition to these units, Baily electric furnaces have recently been installed at three Canadian plants: The Dominion Steel Products Company, of Brantford, Ontario, The Monarch Metals Company, of Hamilton, Ontario, and The Union Screen Plate Company, of Lennoxville, Quebec.

The Electric Furnace Company, Alliance, Ohio, is installing a completely automatic heat-treating set at the new plant of the C. H. Willys Company, of Marysville, Mich. The set is designed to treat all kinds of automobile parts and consists of a 200 K. W. hardening furnace, a motor-operated quench and a 200 K. W. drawing furnace.

A 200 K. W. Baily annealing furnace is being installed at the Springfield plant of the Ohio Steel Foundries Company and a similar outfit but with 300 K. W. electrical capacity, has been ordered for export to The Oddehome Steel Corporation of Norway.

Announcement has been made of the merger of the long established industrial engineering service of W. L. Churchill with that of Albert McDonald and Donald McDonald, all well-known members of the American Society of Mechanical Engineers, under the name of McDonald-Churchill Corporation.

W. L. Churchill is president of the new corporation, Albert McDonald, vice-president and general manager, and Donald McDonald, secretary and treasurer.

The consolidated organization will be in an exceptionally strong position, both professionally and financially, to provide practical and helpful solutions of administrative, managerial and operating problems of industry.

The men who have come together in the new corporation have had wide experience as executives and consultants and their work in increasing production, reducing costs, stabilizing operations and improving financial conditions in many well-known foundries and factories.

Metallic Industries, Inc., St. Louis, has increased its capital from \$200,000 to \$300,000. The company specializes in the manufacture of metal toys and has arranged for the establishment of a new plant in a building formerly owned by the Dorris Motor Car Company.

Leaders in the metal industry are preparing to launch a vigorous "drive against drives" in this industry for the Federation for Support of Jewish Philanthropic Societies of New York by instituting an all year canvass of the metals and allied trades as a substitute for fund-raising campaigns. The metals trade will be directed in the movement by Sam A. Lewisohn. Mr. Lewisohn has accepted an appointment as a member of the Business Men's Council of Federation. This Council is composed of leading business men who have volunteered to give a considerable part of their leisure time for an entire year to a thorough canvass of every industry in New York, in the hope that men and women of every trade will become annual supporters of the Federation, providing thereby an annual income adequate to maintain the ninety-one leading social service institutions that are of the Federation, eliminating all need for future Federation campaigns. Arthur Lehman, of Lehman Brothers, bankers, heads the Business Men's Council; Percy S. Straus, of R. H. Macy & Co., is associate chairman; William Goldman and Manny Strauss, vice-chairmen. Mr. Lewisohn as councillor represents three trade divisions: Metals, Ice and Coal.



### BYZANTINE SILVER CROSS MELTED

Antiquarians all the world over will learn with regret that the famous Byzantine silver gilt cross, with a collection of Fourteenth Century chalices and pyxes preserved in the treasury of Gravedona Paris Church on Lake Como, Italy, has been pillaged and destroyed by thieves.

So highly esteemed in the world of art were these antiquities that during the great war they were removed to the capital for safety. Extraordinary psychological imbecility is revealed in the fact that although the early mediaeval cross alone is valued at 1,000,000 francs the wretched perpetrators of the sacrilege turned over the entire collection to a silversmith for 510 francs.—N. Y. Times, November 22, 1920.

### OPEN SHOP DEMANDED

William H. Barr, president of the National Founders Association, in a speech at its convention held in the Hotel Astor, November 17, 1920, stated that there was a great demand in the country for the open shop principle. Mr. Barr denied the charge that big business was contemplating a tremendous open shop movement, and said, in addition:

"The fact remains, however, that there exists a widespread demand on the part of practically all classes of society for the adoption of the principle of the open shop in the conduct of all business and Government affairs. During the last four years especially the aggressions of union labor have been such that the great majority of the people are beginning to resent the coercive efforts of this small, destructive minority.

"No clearer indication of the possibilities of the union domination which creates this public conviction could be had than the recent disclosures concerning the operations of certain unions in the building trades of New York City which have made it impossible to provide adequate and economical housing for the people of that city. When it is understood that this menacing condition could exist only under the closed shop, is it any wonder that the people are now demanding the open shop form of employment?

#### SAYS UNIONS SEEK TO DOMINATE

"During the last few years, at least, definite efforts have been made to place the control of all industry in the hands of the labor unions, and the leaders were supported in their plan by a type of politician who sought first his own preferment, regardless of constitutional rights or the prosperity of the country. This combination was successful in forcing upon business many uneconomic restrictions. The ultimate purpose was unquestionably the domination of industry through its nationalization.

"A partial, but careful, survey of irresistible activities in behalf of the open shop shows that 540 organizations in 247 cities, of 44 States, are engaged in promoting this American principle in the employment relations. A total of 23 national industrial associations are included in these agencies. In addition, 1,665 local Chambers of Commerce, following the splendid example of the United States Chamber of Commerce, are also pledged to the principle of the open shop."

### A FOUNDRYMEN'S BARBECUE

All human beings are gregarious and like to get together with some common object in view, and foundrymen are no exception. It is indeed a pleasure to meet friends, shake their hands and renew acquaintances, and we often prefer to have such meetings free from discussions of business and its attendant worries.

About six years ago H. M. Lane had a large laboratory in Detroit where some tests in regard to core sands, core binders and the reclamation of old sand were being carried on, and at that time he and E. J. Woodison got together and served what they called a coremakers' dinner. The menu consisted of baked beans, baked sausages and baked potatoes—all cooked in a core oven. Each man's individual dinner was put in a wooden bucket, which was pushed down a conveyor to a point where they would help themselves. The bucket was then turned wrongside up and used as a seat while eating the dinner.

Both gentlemen thought it would be well to have a general foundrymen's dinner again, and the long-talked of event took place on November 13 at H. M. Lane's place on Grosse Isle, Michigan, which is known as Gray Gables. This is a large island

connected with the mainland by a bridge and situated about eighteen miles from Detroit. Mr. Lane secured a bear, and after properly fattening him on pears, apples and other choice foods he was turned into bear meat at the same time that a couple of sheep were turned into mutton.

Invitations were sent out to all foundrymen in this region, and the entire lower floor of the house was fitted up as a dining room, as was also a large garage and shop to the rear. About one hun-



LANE BARBECUE INVITATIONS

dred and fifty signified their intention of attending, but the other fellows evidently thought the matter over, for about two hundred and fifty showed up. Fortunately the potato crop had been so good that with the help of the meat above referred to and certain other viands no one went away hungry.

The invitation sent out consisted of a little envelope on the outside of which was printed, "You'll be there to meet the bear," and the enclosure showed Bruin on the run with two sheep in advance and fate following in the shape of a knife. The non-committal barrel shown in the foreground contained cider, and this, with apples, fried cakes, nuts and the regular food on the menu, seemed to supply everybody with an ample amount of nourishment.

The foundrymen agreed from the core of their heart that they had a sandblasted good time and that to have missed the dinner would have been unbearable.

A photograph of nearly two hundred of the visitors was taken on the lawn before the dinner, which was fortunate, as once they got to the table they ate until dark and then climbed into about eighty automobiles which brought them and drove home.

### PRODUCTION OF COPPER IN THE UNITED STATES IN 1919

The total production of new refined copper in 1919 was 1,768,000,000 pounds, which represents a decrease of 665,000,000 pounds from that in 1918.

#### Primary and Secondary Copper Produced by Regular Refining Plants and Imported in 1919 in Pounds

Primary:	
Domestic—	
Electrolytic .....	1,218,028,921
Lake .....	201,716,335
Casting .....	18,223,145
Pig and best select.....	3,674,191
	1,441,642,592
Foreign—	
Electrolytic .....	324,780,669
Casting and best select.....	1,262,227
	1,767,685,488
Secondary:	
Electrolytic .....	57,018,412

Casting .....	38,876,481
	95,894,893
Total output .....	1,863,580,381

a The separation of refined copper into metal of domestic and foreign origin is only approximate, as an accurate separation at this stage of manufacture is not possible.

The reports for 1919 from plants that treat secondary material exclusively are incomplete at this date. A statement of the secondary production will be published as soon as the figures are available.

In addition to their output of metallic copper the regular refining companies produced bluestone having a copper content of 7,882,574 pounds.

#### STOCKS.

Returns from all producing companies show that their stocks of electrolytic, Lake, casting, and pig copper on hand at the beginning and end of the year were as follows:

#### Stocks of Refined Copper

	Pounds.
Jan. 1, 1920.....	631,000,000
Jan. 1, 1919.....	180,000,000
Increase during 1919.....	451,000,000

In addition to the stocks of refined copper on hand January 1, 1920, 310,000,000 pounds of blister copper and material in process of refining were reported as at smelters in the United States, in transit from smelters to refiners, and at refineries, against 562,600,000 pounds on January 1, 1919. This quantity does not include copper in stock at foreign smelters or in transit from foreign smelters to refineries in the United States.

#### CONSUMPTION.

The apparent consumption of refined new copper in the United States in 1919 was 877,000,000 pounds. In 1918 it was 1,662,000,000 pounds. The method employed in determining the quantity of copper retained for domestic consumption is shown in the following table, which does not include stocks of copper held by consumers:

#### Brass Exported from the United States in 1918 and 1919

	1918		1919	
	Quantity. Pounds	Value.	Quantity. Pounds	Value.
Scrap and old.....	4,909,820	\$799,318	1,321,767	\$176,028
Bars, plates, and sheets .....	30,989,717	9,522,934	7,770,671	2,310,561
Cartridge shells, empty .....		566,829		169,961
Pipes & fittings .....		1,137,336		1,413,875
Wire.....	1,748,883	707,287	1,115,908	403,899
All other mfgs.....		17,071,694		9,438,554
	37,648,420	\$29,805,398	10,208,346	\$13,912,878

H. A. C. JENSEN—U. S. G. S.

### THE ITALIAN METAL INDUSTRY

The occupation of the works on the part of armed workpeople, that was already an accomplished fact at the beginning of September, was followed later by a more general occupation in many parts of the peninsula, with continual riots between the workmen themselves and conflicts with the authorities, although these acted with the greatest moderation, and by a less pronounced movement in the chemical industry, the leather industry and the textile industry, where it did not, however, take any very large extension.

So serious a condition of affairs, brought on several meetings between the representatives of the industrials and the representatives of the workpeople, but nothing conclusive followed until meetings were held at Turin and at Rome, presided over by the Italian Prime Minister Giolitti, during which a commission was formed having six members named by the industrials and by the workpeople, four of which are technical people or employees.

This commission will formulate proposals that can later serve the Italian Government in the formation of a law that will have the scope of organizing the industry on the basis of the intervention of the workpeople in the technical and financial control, or administration of the works. Besides this the new wages were arranged, being considered as having been initiated from the past July, and not from the day of the normal return to work. All other compensations arranged before the occupation of the works are thereby cancelled.

After similar results a referendum was arranged by the agitation committee, during which 127,904 workmen voted favorably, and 44,531 against the evacuation of the works. This decided the question, and the different works returned little by little to their original proprietors.

### TRADE PUBLICATIONS

**Conical Mill.**—A folder issued by the Hardinge Company, 120 Broadway, New York City, with five important questions and their answers about the mill.

**Grinding Data.**—Booklet No. 4 issued by the Hardinge Company, on grinding problems; also booklet No. 5.

**Care of Electric Hoists II.**—Bulletin No. 7, issued by the Foundry Equipment Manufacturers' Association.

**Sand Mixing Equipment.**—Bulletin No. 8, issued by the Foundry Equipment Manufacturers' Association.

**Gunite Slabs.**—A report showing results of tests made on gunite slabs, together with working tables and safe-load tables established through these tests, issued by the Cement Gun Company, Inc., Allentown, Pa.

**Electrical Alloys.**—A folder on heat resistance materials—calido and rayo for use in electrically heated devices, electric ovens, electric furnaces, etc., issued by the Electrical Alloy Company, Morristown, N. J.

**Elevators and Conveyors.**—A new catalog issued by the Dodge Sales and Engineering Company, of Mishawaka, Indiana. This is a most comprehensive catalog and should constitute a test book on the subject, which it covers in detail. It includes tables of data, designs involving gears, pitches, numbers of teeth and shaft sizes. The catalog has been in preparation for over a year and a half, under the direction of A. O. Gates, M.E., of the above concern, whose method of designs of bucket elevators has, it is claimed, resulted in greatly improved elevator practice.

**Scales, Trucks, Counting Machines and Calling Systems.**—A set of catalogues issued by the New York Scale Company, of Chicopee Falls, Mass., covering these topics. The catalogs are complete, well illustrated, and attractively made up. They should be included in every manufacturer's catalog file.

**Monel Metal.**—A folder issued by the Electrical Alloy Company, showing some of their monel metal products.

**Heat Treating and Annealing Furnaces.**—A reprint of a lecture given by Mr. G. P. Mills, on November 6th, before the Association of Iron and Steel Electrical Engineers, Philadelphia section on "Electrical versus Combustion Furnaces."

**Magno-Ignition Metal.**—An electro explaining the use of this metal in spark plug and electrodes, issued by the Electrical Alloy Company, Morristown, N. J.

**American Chamber of Commerce in London.**—Year Book issued by this Chamber of Commerce, including names, addresses, and business classifications of over a thousand American and British firms and individuals interested in developing business between the two countries.

**Reclamation of Metal.**—An illustrated folder issued by the Hardinge Company, explaining and illustrating the use of the Hardinge Conical Mill for the recovery of foundry wastes.

**Foundry Molding Machines.**—Catalog No. 10, covering Mumford molding machines, manufactured and distributed by the Hanna Engineering Works, Chicago, Ill. The catalog covers a wide field of molding machines and is profusely illustrated with photographs, sketches and drawings. It will be a useful addition to the foundry catalog file.

**Industrial Instruments.**—A set of pamphlets from the Bacharach Industrial Instrument company, 422 First avenue, Pittsburgh, Pa., covering recording air and gas meters, pressure draft recorders, pilot tubes and orifices, pocket CO<sub>2</sub> indicator and heat temperature thermometers.



**Carbonfree Metals and Alloys.**—The Metal & Thermit Corporation, New York, has issued the fourth edition of its Thermit Carbonfree Metals & Alloys Pamphlet No. 20. The pamphlet contains a detailed description of the properties and characteristics of the various carbonfree metals and alloys manufactured by this company.

**Rail Welding.**—The Metal & Thermit Corporation, New York, has issued, and will distribute on request, a new and revised Thermit Rail Welding Pamphlet, No. 39, which describes the various ways in which thermit welding can be advantageously used for rail welding, such as for eliminating rail joints and track maintenance expense in ordinary paved track.

**Mill and Foundry Welding.**—The Metal & Thermit Corporation, New York, has just issued, and will distribute on request, the third edition of the Thermit Welding Pamphlet, No. 17, for mill and foundry repairs. The new edition has been revised and brought up to date both as regards new

practices recommended, and illustrations showing recent interesting repairs on certain types of equipment which were executed since the publication of the former edition.

### METAL STOCK MARKET QUOTATIONS

	Par	Bid	Asked
Aluminum Company of America.....	\$100	\$590	\$640
American Brass .....	100	167	172
American Hardware Corp.....	100	132	136
Bristol Brass .....	25	21	24
International Silver, com.....	100	25	..
International Silver, pfd.....	100	87	91
New Jersey Zinc.....	100	147	151
Rome Brass & Copper.....	100	130	140
Scovill Mfg. Co. ....	100	320	360
Yale & Towne Mfg. Co.....	..	275	285

Corrected by J. K. Rice, Jr., & Co., 36 Wall Street, New York.

### METAL MARKET REVIEW

WRITTEN FOR THE METAL INDUSTRY BY W. T. PARTRIDGE

#### COPPER.

Sales of copper in November are estimated 150,000,000 pounds and probably 125,000,000 of this total was disposed of before the end of the first half. In October sales of producing interests on domestic and foreign account amounted to 140,000,000 pounds. Thus total sales in the last sixty days are larger than during the preceding four months combined and only 11,000,000 pounds less than during the immediately preceding five months. Notwithstanding these increased transactions the market remained heavy and weak especially in the outside market where prices have fallen  $1\frac{1}{4}$  to  $1\frac{3}{4}$ c. a pound on electrolytic since the first of the month. Lake copper, too, has sold down  $1\frac{1}{4}$  to  $1\frac{1}{2}$ c. a pound and casting copper has receded  $1\frac{3}{4}$ c. a pound for early shipment. Today prime lake copper is available at 14c. delivered and casting at  $13\frac{3}{4}$ c. f. o. b. producers' works for prompt and December shipment. Electrolytic is selling at  $13\frac{3}{4}$  to  $13\frac{1}{2}$ c. f. o. b. refinery for prompt and December shipment and is available at  $13\frac{3}{4}$  to 14c. f. o. b. refinery equivalent to 14 to  $14\frac{1}{4}$ c. delivered for shipment over the first quarter of next year. Large producing interests, however, have yielded very reluctantly. Most of the sales in November were made at 15c. delivered for shipment over the first quarter of 1921, but in the last week sales have been made at  $13\frac{3}{4}$  to 14c. delivered, but producers are now refusing to sell at these prices. Thus producers' prices have receded  $\frac{1}{2}$  to  $\frac{3}{4}$ c. a pound. Some large producers have no fixed price and are holding aloof.

Statistically, the market is still suffering from an oversupply due to heavy stocks and although production of the U. S. smelters has decreased from 122,000,000 pounds in January to 100,000,000 pounds in November, and imports have decreased from 35,000,000 pounds early in the year to 25,000,000 pounds in the last sixty days, the current output is still equal to deliveries into domestic and foreign consumption.

On the other hand, it may be noted that the domestic consumption has decreased from 130,000,000 pounds during the first quarter of the year to about 80,000,000 pounds during the latter part of the summer and early fall months and exports have also decreased sharply. Total foreign shipments, however, during the first nine months of the year were larger than during the whole twelve months of 1919.

Sales of copper during the first eleven months of this year are estimated at 1,372,000,000 pounds. Deliveries into domestic consumption have been only slightly less, 1,220,000,000 pounds, and total deliveries into domestic and foreign consumption have been 1,770,000,000 pounds. Production of refined copper during the first eleven months was approximately 1,640,000,000 pounds so that surplus stocks have been reduced between 140,000,000 and 145,000,000 pounds. Stocks of refined copper today are probably about 555,000,000 pounds, whereas there were 700,000,000 pounds when the year began, including 100,000,000 pounds carried abroad.

#### TIN.

The tin market in November registered a net decline of  $6\frac{1}{4}$ c. per pound on spot Straits metal, from 40c., November 1, to  $33.12\frac{1}{2}$ c. on November 30. Banca tin, which opened at the Straits level, closed at 34c. American pure was off, from  $39.37\frac{1}{2}$ c. at the beginning of the month to the Straits closing price,  $33.12\frac{1}{2}$ c.

per pound, while 99 per cent. metal declined from  $38.87\frac{1}{2}$ c. on November 1, to 33c. on November 30. The governing influence in the decline was, of course, the violent break in foreign prices of tin and in sterling exchange, both factors of prime importance in tin values. The closing figures show prices to have reached the level of those prevailing during the fourth quarter of 1915, the average for that year being 38.66c. per pound. Business at the end of November was for prompt deliveries to the larger consumers, the general view being expressed that prices might be expected to go to even lower levels before final adjustment was completed.

#### LEAD.

Lead suffered severely in the general decline of business and prices during the past month. The American Smelting & Refining Company, in order to meet competitive business from abroad, as well as at home, made a drastic reduction in its basis, from 7.00c. East St. Louis, 7.25c. New York, to 5.50c. in both Eastern and Western markets during the month. This was brought about in four declines, the first announced November 9, was  $\frac{1}{4}$ c. to 7.00c. New York, which made the Eastern and Western levels identical. The second was  $\frac{1}{2}$ c. per pound to 6.50c., effective November 16. The third, on November 23, carried to 6.00c., and the last, announced November 30, was another  $\frac{1}{2}$ c. to 5.50c. per pound, making the total reduction 1.75c. New York, 1.50c. East St. Louis. In the outside market, including offerings of reshipment lead from England, the downward trend carried prices from 6.60c. East St. Louis,  $6.87\frac{1}{2}$ c. New York, for prompt, to  $5.12\frac{1}{2}$ -5.25c., bid and asked, in both the Eastern and Western markets; December, at the same time, being available at 5.10-5.20c. Thus, the total decline was  $1.47\frac{1}{2}$ c. East St. Louis, 1.75c. New York. The market, at the end of the month, was dull and easy, the outlook being more or less dubious until general conditions improve.

#### ZINC.

Light demand, large supplies and a general falling off in all business, particularly in brass-making and the galvanizing trade, as affecting zinc, combined with the uncertainty attending readjustment following war conditions, brought about heavy declines in the zinc market in November. The recession at East St. Louis was  $1.27\frac{1}{2}$ c. per pound to  $5.62\frac{1}{2}$ c., from 6.90c. for prompt, at the beginning of the month. New York prices declined 1.30c. from 7.40c. November 1, to 6.10c. on November 30. These prices are the lowest since 1915, when the average for January at East St. Louis was 6.33c. per pound, while at New York the average for that month was 6.52c. Stocks on hand at smelters on October 31, despite the heavily decreased production, showed an increase of 2,000 tons to 51,231 tons, while shipments were decreased. Exports from port of New York amounted to only 18 tons, and reshipments from England were still offered in quantities sufficiently heavy to affect prices.

#### ALUMINUM.

While the domestic producer's schedule of prices—33.10c. for aluminum 99 per cent. and purer, 32.90c. for 98-99 per cent., 32.10c. for No. 12 alloy, and 47.29c. for sheet 18 gauge and heavier,

in 15-ton lots, producing plants, remained unchanged during November, prices in the outside market continued the downward trend prevailing in all other metals. After opening at 28-29c. for 98-99 per cent. virgin, 26-27c. for 98-99 per cent. remelted, and 24-25c. for No. 12 alloy, prices were stationary until November 18, when a decline of  $\frac{1}{2}$ c. per pound was made to induce purchases. There being practically no response to this, more drastic action was taken in a drop of 1c. on November 22; by November 24, prices were off another  $\frac{1}{2}$ c., and on November 29, were down to 25-26c. for 98-99 per cent. virgin, 23.50-24.50c. for 98-99 per cent. remelted, and 22.50-23.50c. for No. 12 alloy. Thus, there was a decline of 3c. on virgin 98-99 per cent., 2.50c. on 98-99 per cent. remelted, and 1.50c. on No. 12 alloy. Importations in September were again heavy, with arrivals 1,241 tons, making total for first nine months 14,520 tons, as compared with 7,876 tons received in twelve months 1919. Exports in September were 86 tons, making the total outgo, in nine months of 1920, 3,747 tons, as compared with 2,235 tons sent abroad in twelve months of 1919.

#### ANTIMONY.

Antimony prices continued to decline in November, the drop being  $\frac{3}{4}$ c. per pound, from 6.37 $\frac{1}{2}$ c. at the beginning of the month, to 5.75c., duty paid, for carloads, at the end of November. Quotations were largely nominal throughout the month, declines being made in offers to effect sales. Small success attended such efforts, all inquiries received bidding under prevailing offers because of the generally expected further decline. It was pointed out, however, that in pre-war days, the average yearly price of antimony, during 1909 to 1913, inclusive, did not fall below 7.27c. per pound, the highest during the period being 7.63c., established in 1912. During the same period, the lowest average monthly level was 6.05c., established in December, 1913. Importations of antimony in September, 1920, were light, comparatively, there being received 765 tons.

#### SILVER.

While fluctuations in prices of bar silver of foreign origin were no so wide as during October, they covered a range of 14 $\frac{1}{2}$ c. from 82 $\frac{3}{4}$ c., the highest level established November 4, to 68 $\frac{1}{4}$ c., the lowest level on November 30, the net decline was less. The opening, made at 80 $\frac{3}{4}$ c., and the close at 68 $\frac{1}{4}$ c., represented a net decline of 12 $\frac{3}{4}$ c. per ounce, as compared with a net decline of 11c. in October. Domestic silver, by reason of the Pittman Act, continued pegged at 99 $\frac{1}{2}$ c. Importations during September, 1920, amounted to \$6,501,028, while during the first nine months of the year \$73,496,929 were received. Exports during September were \$6,517,434, while during the first nine months \$98,682,827 were sent abroad. Thus, the excess of exports over imports in September amounted to \$76,406, while during the first nine months of the year as a whole, exports exceeded imports by \$25,185,898.

#### QUICKSILVER.

Prices of quicksilver, after holding steadily at \$60 per flask of 75 pounds—this being the low level established late in October—until November 30, then dropped \$5 per flask to \$55. Demand throughout the month was light, supplies being ample to meet all requirements. The United States Bureau of Statistics places the

September outgo at 4,480 pounds, valued at \$5,063. Total exports during the first nine months, inclusive, were 111,723 pounds, valued at \$125,052, as compared with corresponding period of 1919, when 569,091 pounds, valued at \$684,348, were sent abroad.

#### PLATINUM.

Prices of platinum, after the decline to \$95-105 per ounce for pure, on October 28, were unchanged until November 11, when there was a drop to \$85-90 per ounce, bid and asked prices. These quotations were unchanged until November 26, when \$85 became also the asking price, making the total decline \$20 per ounce. Total importations during the first nine months of 1920, according to the United States Bureau of Statistics, were 58,644 ounces, valued at \$6,417,714, as compared with 40,268 ounces, valued at \$3,714,141, in the corresponding period of 1919.

#### OLD METALS.

Conditions in old metals at the close of November were characterized, by some in the trade, as being disastrous. Prices had crumbled along the entire list, the heaviest declines being 4c. on block tin pipe to 28c. per pound, and 3c. on pure tin foil to 23c. per pound. A decline of 1 $\frac{1}{2}$ c. was registered on new type shell cuttings to 7c., and on brass turnings to 5c., while clean, red car boxes were off and equal amount to 9c. per pound. One cent declines were noted on strictly crucibled copper to 11c., on uncrucibled copper to 10c., on clean aluminum borings to 7.50c., on clean, hand-picked shells to 41c., old cast aluminum to 13c., new brass clippings to 7c., and on stereotype to 4.75c. One-half cent declines were made on light copper to 9.50c., No. 1 composition turnings to 9c., old sheet aluminum to 14c., and on heavy brass to 6c. Each of the following items were off  $\frac{1}{4}$ c. per pound: tea lead to 3c., battery lead to 2.25c., and stereotype dross to 2.50c.

#### WATERBURY AVERAGE

Lake Copper. Average for 1919, 19.55. 1920—January, 19.25.—February, 19.125.—March, 18.875.—April, 19.125.—May, 19.00.—June, 18.50.—July, 19.00.—August, 18.75.—September, 18.75.—October, 16.875.—November, 15.25.

Brass Mill Zinc. Average for 1919, 8. 1920—January, 9.75.—February, 9.40.—March, 9.15.—April, 8.85.—May, 8.30.—June, 8.15.—July, 8.45.—August, 8.55.—September, 8.45.—October, 7.50.—November, 7.00.

#### NOVEMBER MOVEMENT IN METALS

Copper:	Highest	Lowest	Average
Lake .....	15.50	14.00	14.969
Electrolytic .....	15.00	13.37 $\frac{1}{2}$	14.394
Casting .....	14.50	13.12 $\frac{1}{2}$	14.125
Tin .....	40.00	33.12 $\frac{1}{2}$	37.019
Lead .....	6.87 $\frac{1}{2}$	5.62 $\frac{1}{2}$	6.328
Zinc (brass special).....	7.40	6.10	6.865
Antimony .....	6.37 $\frac{1}{2}$	5.75	6.047
Aluminum .....	29.00	25.00	27.80
Quicksilver (per flask).....	60.00	55.00	59.75
Silver (cts. per oz.) Foreign...	82.62 $\frac{1}{2}$	68.12 $\frac{1}{2}$	77.641

## Metal Prices, December 1, 1920

#### NEW METALS

##### Open Market

COPPER—DUTY FREE. PLATE, BAR, INGOT AND OLD COPPER.	
Manufactured 5 per centum.	Cents
Electrolytic, carload lots, delivered.....	13 $\frac{1}{4}$ –14
Lake, carload lots, delivered.....	14
Casting, carload lots, delivered.....	13 $\frac{1}{4}$
TIN—Duty free.	
Straits of Australian, carload lots.....	33 $\frac{1}{4}$
LEAD—Duty, Pig. Bars and Old, 25%; pipe and sheets.	
20%. Pig lead, carload lots.....	5–5 $\frac{1}{2}$
ZINC—Duty 15%.	
Brass Special .....	6.00
Prime Western, carloads lots.....	6.12 $\frac{1}{2}$
ALUMINUM—Duty, Crude, 2c. per lb. Plates, sheets, bars and rods, 3 $\frac{1}{2}$ c. per lb.	
Small lots, f. o. b. factory.....	.....
100-lb. f. o. b. factory.....	.....
Ton lots, f. o. b. factory.....	24–33.10

#### ANTIMONY—Duty 10%.

Cookson's, Hallet's or American.....	Nominal
Chinese, Japanese, Wah Chang WCC, brand spot	5.75
NICKEL—Duty, Ingot, 10% ad valorem. Sheet, strip, strip and wire, 20%.	
Ingot .....	43.00
Shot .....	43.00
Electrolytic .....	45.00
MANGANESE METAL	
MAGNESIUM METAL—Duty 20% ad valorem (100 lb. lots)	
BISMUTH—Duty free .....	\$1.60–\$1.75
CADMIUM—Duty free .....	2.55–2.57
CHROMIUM METAL—Duty free.....	1.40–1.50
COBALT—97% pure.....	Nominal
QUICKSILVER—Duty 10% per flask of 75 pounds....	\$6.00
PLATINUM—Duty free, per ounce.....	55.00
SILVER—Government assay—Duty free, per ounce....	\$75–\$85
GOLD—Duty free, per ounce.....	.99 $\frac{1}{2}$
	\$20.67



# Metal Prices, December 1, 1920

## INGOT METALS

Silicon Copper, 10%.....	according to quantity	49	to 55
Silicon Copper, 20%.....	" " "	36	to 40
Phosphor Copper, guaranteed 15% ..	" " "	21	to 30
Phosphor Copper, guaranteed 10% ..	" " "	20	to 30
Manganese Copper, 30%.....	" " "	50	to 56
Phosphor Tin, guarantee 5%.....	" " "	45	to 55
Phosphor Tin, no guarantee.....	" " "	45	to 55
Brass Ingot, Yellow.....	" " "	11	to 12
Brass Ingot, Red.....	" " "	14	to 15½
Brass Ingot .....	" " "	16½	to 19
Parsons Manganese Bronze Ingots ..	" " "	20	to 21½
Manganese Bronze Castings.....	" " "	28	to 39
Manganese Bronze Ingots.....	" " "	15	to 18
Manganese Bronze Forgings.....	" " "	30	to 40
Phosphor Bronze .....	" " "	24	to 30
Casting Aluminum Alloys.....	" " "	21	to 25
Monel Metal .....	" " "	38	to ..

## OLD METALS

Buying Prices		Selling Prices	
11 to 11½	Heavy Cut Copper.....	12¾	to 13¾
10¾ to 11¼	Copper Wire .....	12½	to 13
9 to 9½	Light Copper .....	11½	to 12
11 to 11½	Heavy Machine Comp.....	13	to 13½
7 to 7½	Heavy Brass .....	9	to 9½
5 to 5½	Light Brass .....	7	to 7½
6 to 6½	No. 1 Yellow Brass Turnings.....	7½	to 8
10½ to 11	No. 1 Comp. Turnings.....	12½	to 13
4.25	Heavy Lead .....	4.90	
4.25	Zinc Scrap .....	5.00	
7 to 10	Scrap Aluminum Turnings.....	8	to 11
16 to 18	Scrap Aluminum, cast alloyed.....	18.50	to 20.00
19.00	Scrap Aluminum, sheet (new).....	21½	
26.00	No. 1 Pewter .....	30.00	
15.00	Old Nickel anodes.....	17.00	
23 to 25	Old Nickel .....	27	to 29

## BRASS MATERIAL—MILL SHIPMENTS

In effect August 23, 1920.

To customers who buy 5,000 lbs. or more in one order.

	Net base per lb.		
	High Brass.	Low Brass.	Bronze
Sheet .....	\$0.20¾	\$0.22	\$0.23½
Wire .....	.21¼	.23	.24½
Rod .....	.18¾	.23	.24½
Brazed tubing .....	.34	..	.38¾
Open seam tubing .....	.34	..	.38¾
Angles and channels.....	.39	..	.43¾

To customers who buy less than 5,000 lbs. in one order.

	Net base per lb.		
	High Brass.	Low Brass.	Bronze.
Sheet .....	\$0.21½	\$0.23¾	\$0.24¾
Wire .....	.22½	.24¾	.25¾
Rod .....	.19½	.24¾	.25¾
Brazed tubing .....	.35¾	..	.40
Open seam tubing.....	.35¾	..	.40
Angles and channels.....	.40¾	..	.45

## SEAMLESS TUBING

Brass, 25c. to 27c. per lb. base.

Copper, 26c. to 28c. per lb. base.

## TOBIN BRONZE AND MUNTZ METAL

Tobin Bronze Rod.....	22¾c.	net base
Muntz or Yellow Metal Sheathing (14"x48")....	20¾c.	" "
Muntz or Yellow Rectangular Sheets other than Sheathing .....	21¾c.	" "
Muntz or Yellow Metal Rod.....	18¾c.	" "

Above are for 100 lbs. or more in one order.

## COPPER SHEET

Mill shipments (hot rolled).....	22½c.-23½c.	net base
From stock .....	24½c.-28½c.	net base

## BARE COPPER WIRE—CARLOAD LOTS

17¼c. to 18¼c. per lb. base.

## SOLDERING COPPERS

300 lbs. and over in one order.....	25½c.	per lb. base
100 lbs. to 300 lbs. in one order.....	26½c.	per lb. base

## ZINC SHEET

Duty, sheet, 15%.

Cents per lb.

Carload lots, standard sizes and gauges, at mill, 11½c. basis less 8 per cent. discount.

Casks, jobbers' prices..... 13½c.

Open casks, jobbers' prices..... 14c.

## ALUMINUM SHEET AND COIL

Aluminum sheet and coil, base price, 49.10 per lb. contract price; 18 ga. and heavier, 47c. per lb.; 24 ga. and heavier, 42.5c. per lb.

## BLOCK TIN SHEET AND BRITANNIA METAL

Block Tin Sheet—18" wide or less. No. 26 B. & S. Gauge or thicker, 100 lbs. or more, 10c. over Pig Tin. 40 to 100 lbs., 15c. over 25 to 50 lbs., 17c. over, less than 25 lbs., 25c. over.

No. 1 Britannia—18" wide or less. No. 26 B. & S. Gauge or thicker, 500 lbs. or over, 8c. over N. Y. tin price; 100 lbs. or more, 10c. over Pig Tin. 50 to 100 lbs., 15c. over, 25 to 50 lbs., 20c. over, less than 25 lbs., 25c. over.

Above prices f. o. b. mill.

Prices on wider or thinner metal on request.

## MONEL METAL

Shot .....	35
Blocks .....	35
Sheet Bars .....	40
Hot Rolled Rods (base).....	42
Cold Drawn Rods (base) .....	56
Hot Rolled Sheets (base).....	55

Lead Foil—base price—figured on base price of lead at the time.

Platers' metal, so called, is very thin metal not made by the larger mills and for which prices are quoted on application to the manufacturer.

## SILVER SHEET

Rolled silver anodes .999 fine are quoted at from 72c. to 74c. per Troy ounce, depending upon quantity.

Rolled sterling silver, 69c. to 72c.

## NICKEL ANODES

85 to 87% purity.....	.55c.	per lb.
90 to 92% " .....	.57½c.	per lb.
95 to 97% " .....	.60c.	per lb.

# Supply Prices, December 1, 1920

## CHEMICALS

<b>Acid—</b>			
Boric (Boracic) Crystals.....lb.	.20	Carbonate, 80-85% .....	lb. 23
Hydrochloric (Muriatic) Tech., 20 deg., Carboys..lb.	.07	Cyanide, 98-99½%, 100 lb. cases.....lb.	—
Hydrochloric, C. P., 20 deg., Carboys.....lb.	.10	Pumice, ground, bbls.....lb.	.05
Hydrofluoric, 30% .....	.50	Quartz, powdered .....	ton —
Nitric, 36 deg. Carboys.....100 lb.	8.28	Official .....	oz. —
Nitric, 42 deg. Carboys.....100 lb.	8.90	Rosin, bbls. ....	lb. .07
Sulphuric, 66 deg., Carboys.....lb.	.04½	Rouge, nickel, 100 lb. lots.....lb.	.40
<b>Alcohol—</b>		Silver and Gold.....lb.	.60
Denatured .....	gal. 1.25	Sal Ammoniac (Ammonium Chloride) in casks...lb.	.13
<b>Alum—</b>		Silver Chloride, dry.....oz.	1.20
Lump, Barrels .....	lb. .07	Cyanide .....	oz. 1.60
Powdered, Barrels .....	lb. .08	Nitrate, 100 ounce lots.....oz.	.57½
Aluminum sulphate, commercial tech.....lb.	.06	Soda Ash, 58%, bbls.....lb.	.03½
Aluminum chloride solution.....lb.	.30	<b>Sodium—</b>	
<b>Ammonium—</b>		Biborate, see Borax, bbls.....lb.	.10½
Sulphate, tech., Barrels.....lb.	.08½	Bisulphite, tech. bbls.....lb.	.09
Sulphocyanide .....	lb. 1.50	Cyanide, 96 to 98%, 100 lbs.....lb.	.30
Argols, white, see Cream of Tartar.....lb.	.80	Hydrate (Caustic Soda) bbls.....lb.	.05½
Arsenic, white, Kegs.....lb.	.18	Hypsulphite, kegs.....lb.	.06
Asphaltum .....	lb. .35	Nitrate, tech., bbls.....lb.	.07
Benzol, pure .....	gal. .75	Phosphate, tech., bbls.....lb.	.06
Blue Vitriol, see Copper Sulphate.		Silicate (Water Glass) bbls.....lb.	.03
Borax Crystals (Sodium Biborate), Barrels.....lb.	.10½	Sulpho Cyanide .....	lb. .90
Calcium Carbonate (Precipitated Chalk).....lb.	.20	Soot, Calcined .....	lb. —
Carbon Bisulphide, Drums.....lb.	.12	Sugar of Lead, see Lead Acetate.....lb.	.35
Chrome Green .....	lb. —	Sulphur (Brimstone) bbls.....lb.	.04
Cobalt Chloride .....	lb. —	Tin Chloride .....	lb. .65
<b>Copper—</b>		Tripoli .....	lb. .03½
Acetate .....	lb. .60	Verdigris, see Copper Acetate.....lb.	.60
Carbonate, Barrels .....	lb. .29	Water Glass, see Sodium Silicate, bbls.....lb.	.03
Cyanide .....	lb. .68	<b>Wax—</b>	
Sulphate, Barrels .....	lb. .08	Bees, white ref. bleached.....lb.	1.00
Copperas (Iron Sulphate, bbl.).....lb.	.04	Yellow No. 1 .....	lb. .60
Corrosive Sublimate, see Mercury Bichloride.		Whiting .....	lb. .10
Cream of Tartar, Crystals (Potassium bitartrate)...lb.	.80	Zinc, Carbonate, bbls. ....	lb. .26
Crocus .....	lb. .15	Chloridé, 600 lb. lots.....lb.	.13½
Dextrin .....	lb. .25	Cyanide .....	lb. .49
Emery Flour .....	lb. .10	Sulphate, bbls. ....	lb. .04½
Flint, powdered .....	ton —	<b>COTTON BUFFS</b>	
Fluor-spar (Calcic fluoride).....ton	—	Open buffs, per 100 sections (nominal).	
Fusel Oil .....	gal. 6.50	12 inch, 20 ply, 64/68, cloth.....base, \$54.35	
Gold Chloride .....	oz. 14.00	14 " 20 " 64/68, " .....	" 67.50
<b>Gum—</b>		12 " 20 " 84/92, " .....	" 57.95
Sandarac .....	lb. —	14 " 20 " 84/92, " .....	" 78.10
Shellac .....	lb. —	Sewed buffs, per pound	
Iron, Sulphate, see Copperas, bbl.....lb.	.04	Bleached and unbleached.....	" 1.00
Lead Acetate (Sugar of Lead).....lb.	.35	<b>FELT WHEELS</b>	
Yellow Oxide (Litharge).....lb.	.25	<b>WHITE SPANISH—</b>	
Mercury Bichloride (Corrosive Sublimate).....lb.	.148	Diameter—8" to over 16" Thickness—¼" and ¾" ..	\$4.00
<b>Nickel—</b>		" 8" " 1" to 3"....	3.35
Carbonate Dry .....	lb. .80	" 10" to 16" " 1" to 3"....	3.25
Chloride, 100 lb. lots.....lb.	.55	" over 16" " 1" to 3"....	3.35
Salts, single, bbls.....lb.	.16	" 8" to over 16" " over 3"....	3.40
Salts, double, bbl.....lb.	.15	<b>GREY MEXICAN—</b>	
Paraffin .....	lb. .30	Diameter—8" to over 16" Thickness—¼" and ¾" ..	\$3.90
Phosphorus—Duty free, according to quantity.....	32-38	" 8" " 1" to 3"....	3.25
Potash, Caustic, Electrolytic 88-92% fused.....lb.	.32	" 10" to 16" " 1" to 3"....	3.15
Electrolytic 70-75% fused.....lb.	.26	" over 16" " 1" to 3"....	3.25
Potassium Bichromate, Casks.....lb.	.20	" 8" to over 16" " over 3"....	3.30

Above are even diameters. Odd diameters 50c advance.



# THE METAL INDUSTRY

WITH WHICH ARE INCORPORATED  
THE ALUMINUM WORLD: COPPER AND BRASS: THE BRASS FOUNDER AND FINISHER:  
**ELECTRO-PLATERS REVIEW.**

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JANUARY—DECEMBER, 1920

THE METAL INDUSTRY PUBLISHING COMPANY, 99 John Street, New York

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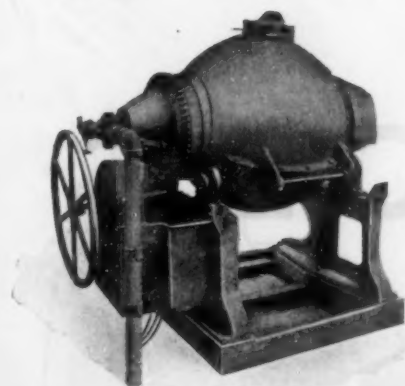
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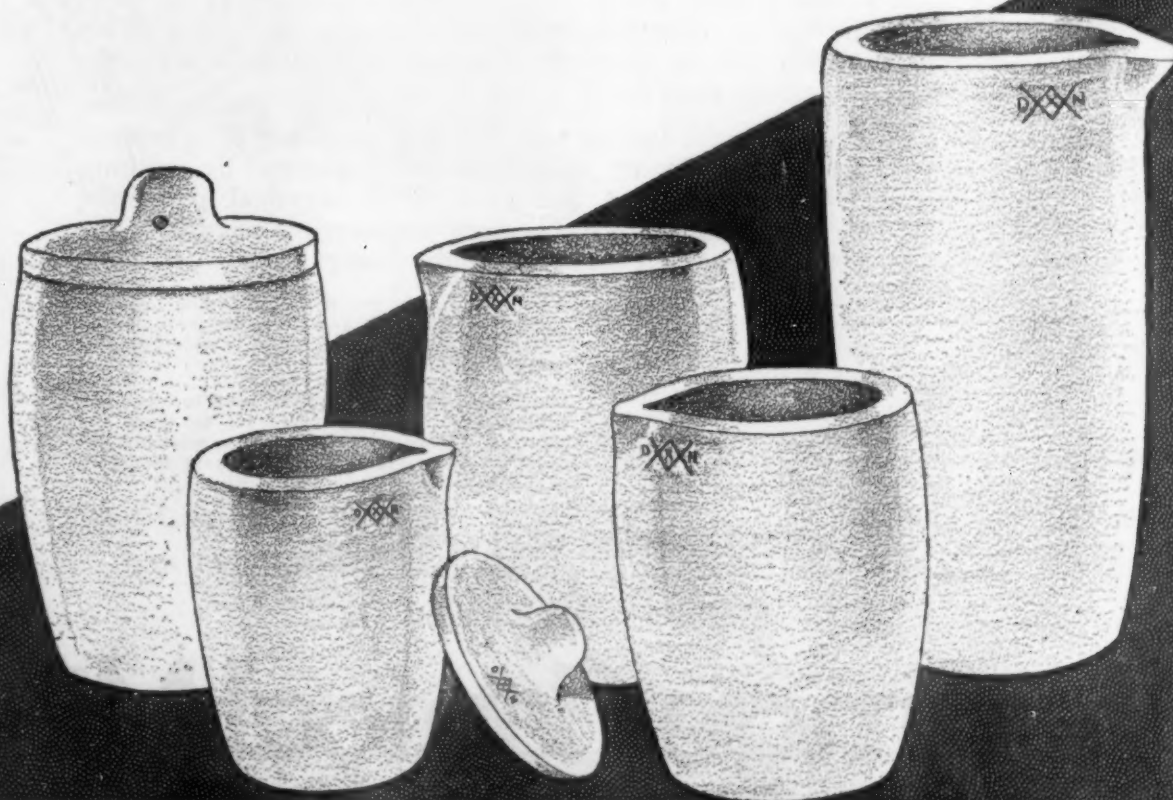
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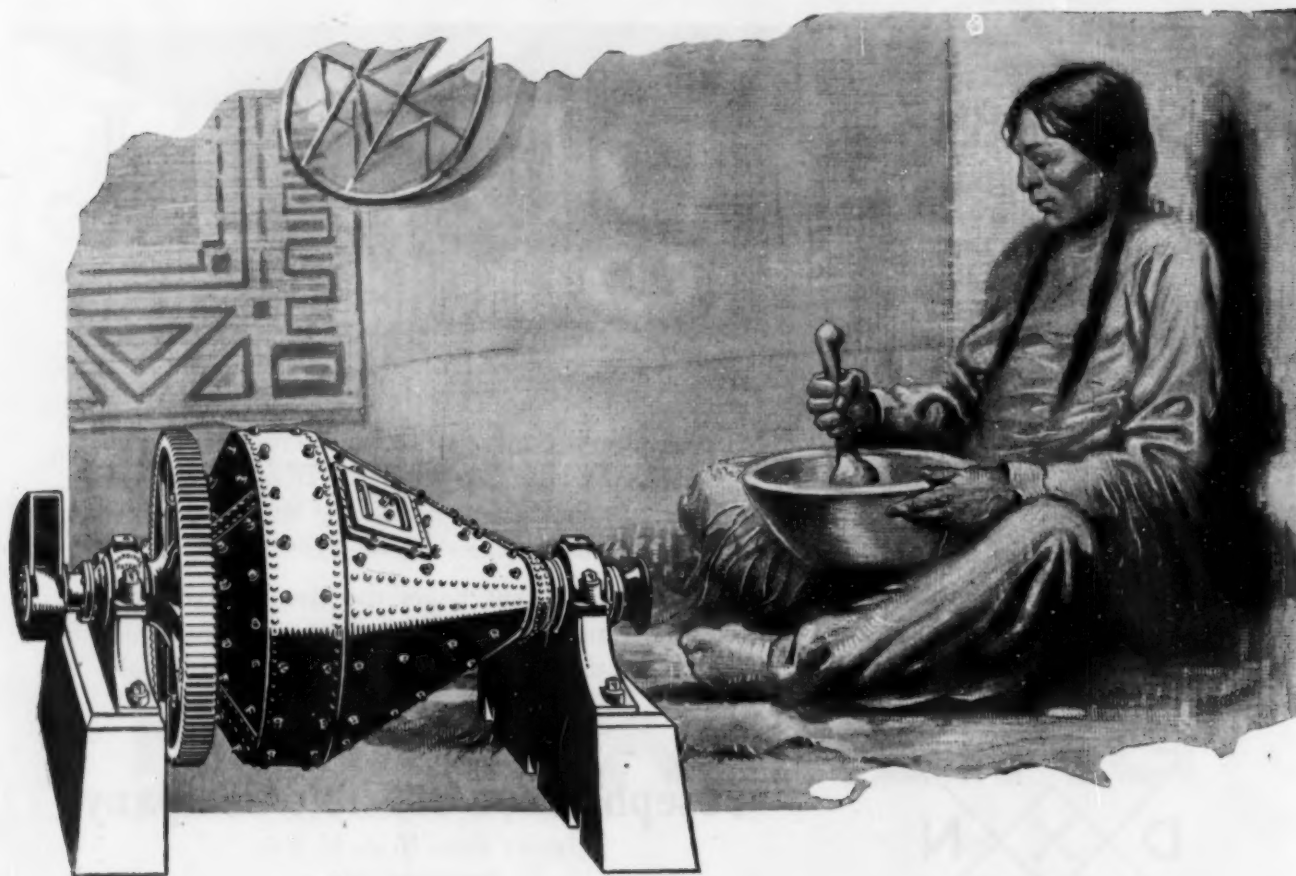


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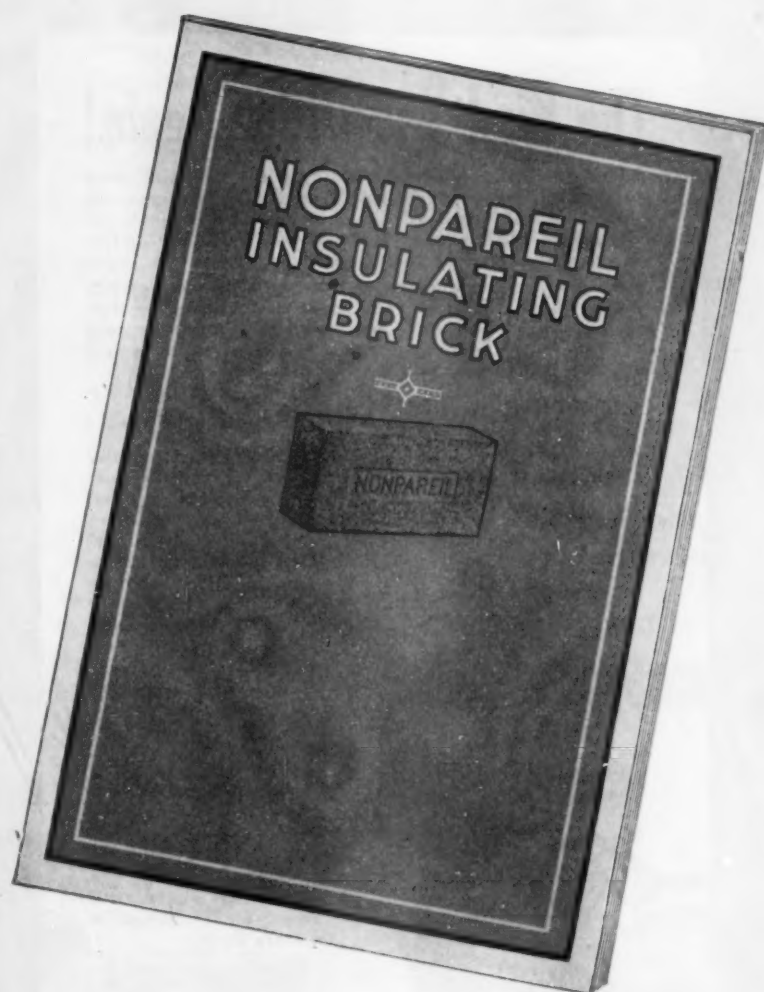
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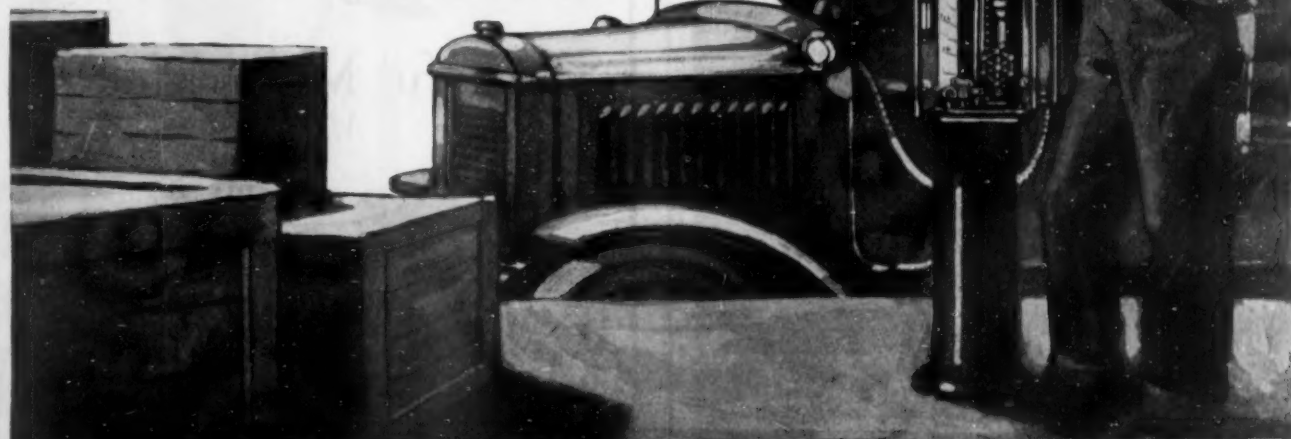
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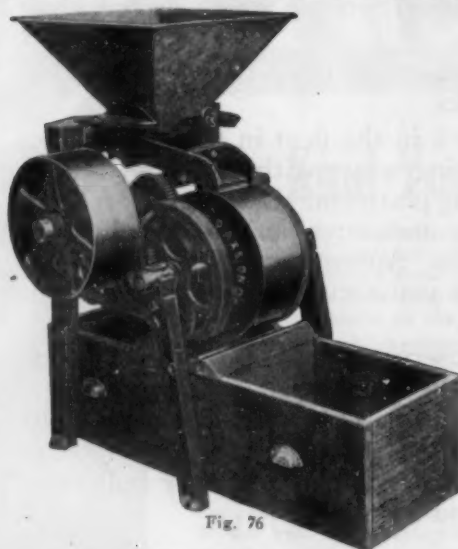


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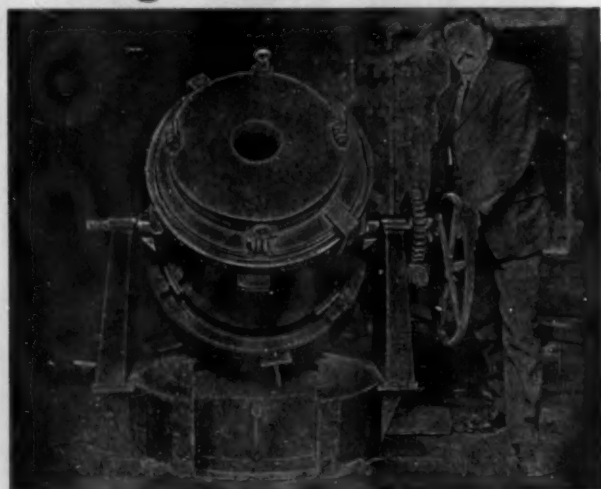
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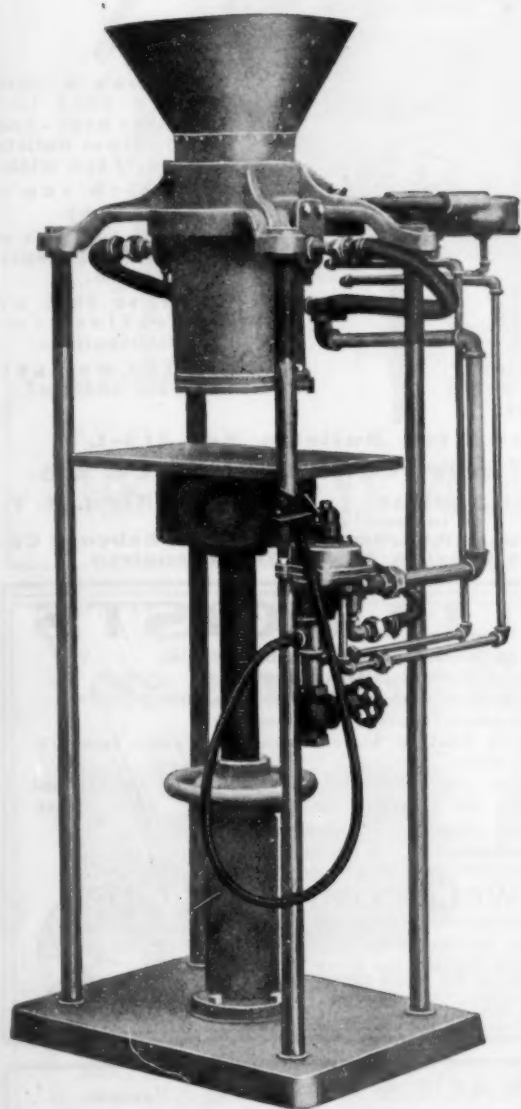


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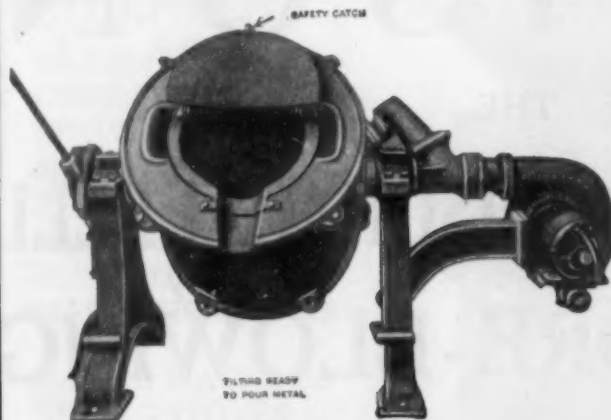
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method is adaptable to your product and manufacturing conditions.

### W. S. ROCKWELL COMPANY

Furnace Engineers and Contractors

50 Church St. Hudson Terminal Bldg. New York

We Make Industrial Heating Furnaces for Every Requirement.

"FURNACE AND FUEL TO SUIT CONDITIONS"

Branches: CHICAGO CLEVELAND DETROIT  
Ellsworth Bldg. Hickox Bldg. Majestic Bldg.



Scientifically  
Designed

Uniform  
Temperature

Substantially  
Constructed

### GAS-INDUSTRIAL FURNACES-OIL

These and many other features are what Surface Combustion Furnaces offer.  
Advise us as to your requirements, and we will submit specifications and  
prices.

Industrial  
Furnace  
Engineers  
and  
Manufacturers

### THE SURFACE COMBUSTION CO.

PHILADELPHIA

PITTSBURG

General Offices and Works  
366-368 Gerard Ave., Bronx,  
New York City, N. Y.  
CHICAGO

Maximum  
Output

One-Valve  
Control

Minimum  
Fuel Cost

### MOORE RAPID 'LECTROMELT BRASS FURNACES



are especially adapted for melting high zinc  
brass, lead and tin bronzes, manganese bronze,  
aluminum and other non-ferrous metals.  
They will melt down to a charge of the foregoing  
metals in one hour or less time.

**PITTSBURGH ELECTRIC FURNACE CORP.**  
(Makers of Furnaces for Steel, Iron, Brass and Ferro-Alloys).  
Pittsburgh, U. S. A.

## Briquette Your Scrap Metals

The Ronay Process saves labor, metal, time and fuel.

Send for Bulletin "I."

**GENERAL BRIQUETTING CO.,**  
25 Broad St., New York



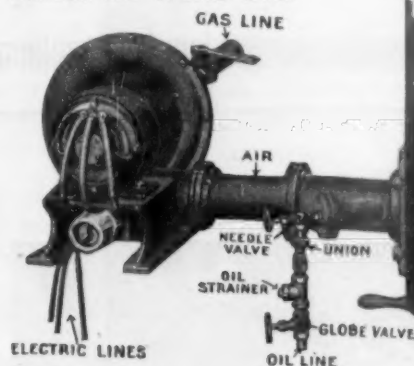
# BUCKEYE PRODUCTS

## METAL MELTING FURNACES

Crucible and Non-Crucible Using  
All Kinds of Fuels

### BUCKEYE PARTING

Famed the World Over



### LINCO CORE COMPOUND

BUCKEYE CORE OILS

BUCKEYE CORE BINDER

CORE BAKING OVENS

For All Fuels

BUCKEYE

HIGH TEMPERATURE  
FURNACE CEMENT

Withstands Extreme Heat

BUCKEYE BRASS FLUX

A Reliable Metal Cleanser

AIR AND ELECTRIC  
VIBRATORS

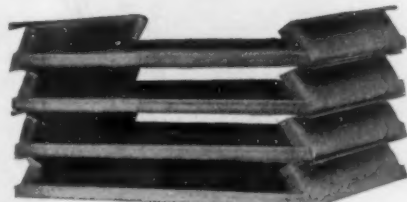
Consultation and expert  
advice freely at your serv-  
ice regarding any furnace  
and metal melting problem.

## THE BUCKEYE PRODUCTS COMPANY,

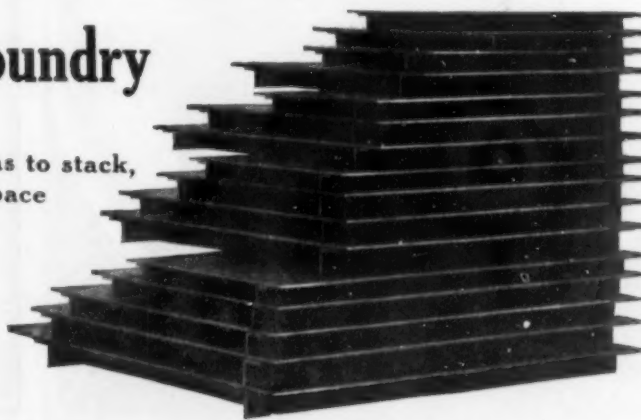
919-929 W. Fifth Street  
Cincinnati, Ohio, U. S. A.

Mfrs. Foundry Facings, Core Oils, Supplies, Equipment and Metal Melting Furnaces

## Core Trays For The Foundry



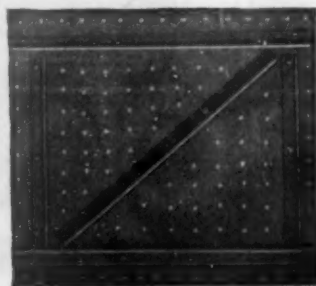
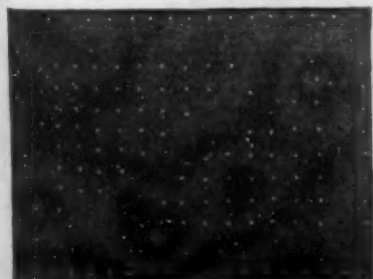
Made so as to stack,  
utilizing space  
in the  
core oven



Strongly made from sheet steel. Reinforced on sides with two folds of the sheet turned at right angles to the bottom, giving the tray the necessary stiffness.

Stock sizes 20" x 12" x 2"—3", 4" or higher.  
16 or 18 Gauge Steel.

Furnished with reinforced angle iron on bottom and perforated when specified. Special sizes to order.



### "NEVER BREAK" ALL STEEL CORE TRAYS

For the prevention of crooked cores

### "NEVER BREAK" ALL STEEL BOTTOM PLATES

For the prevention of Burnt Bottom Boards

They are reinforced, unbreakable, absolutely straight, cheaper than cast iron and only one-third the weight.

30 STANDARD SIZES OF EACH CARRIED IN STOCK.  
SPECIAL SIZES TO ORDER.

Send for "Never Break" Circular

THE WADSWORTH CORE  
MACHINE & EQUIPMENT CO.

AKRON, OHIO



Forty years devoted exclusively to the making of crucibles and allied products. Send us your next order. Other orders will follow. Write for prices.

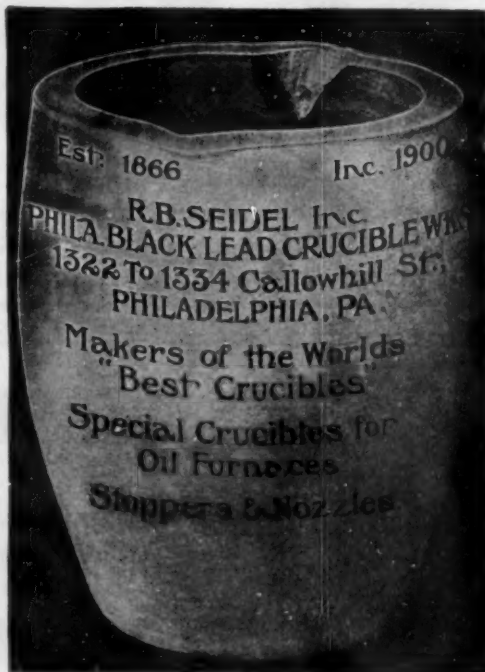
**McCullough - Dalzell Crucible Co.**  
PITTSBURGH, PA.



## THE STANDARD IN CRUCIBLES

FOR  
OVER 60 YEARS

**J. H. GAUTIER & CO.**  
JERSEY CITY, N. J.



**Crescent  
Refractories Company**

Three Plants  
PRODUCING

**High Grade Clearfield  
County Fire Clay  
Refractories**

CURWENSVILLE - - PENNA.

## HYTEMPITE

High  
Temperature  
Cement

For bonding and repairing fire clay or silica  
brick work, tile, retorts, crucibles, etc.  
Quigley Furnace Specialties Co., 26 Cortlandt St., N. Y.



**ESSO**

**We Solicit the  
Complete requirements for your  
Brass, Bronze or Aluminum Foundry—  
Also Entire New Installations**

**Everything You Need In Your Foundry**

Our Stock of Crucibles, Flasks, Shovels, Rammers, Wire Brushes, Sprue Cutters, Riddles, Soft Brushes, Tumbling Barrels, Brass Melting Furnaces, Furnace Linings, etc., is the most complete in the country.

Reduce the metal loss in slag and keep your ladles, furnaces and metals clean with Rillton Brass Cleaner. Hott-Patch Furnace Cement outlasts fire clay 20 times, stands a temperature of 3100 degrees and is ideal as a lining as well as for all kinds of repair work where the best refractory material counts.



The Double Success

**Rillton Brass Cleaner**

**Hott-Patch Furnace Cement**

Barrel on Approval if You Wish

## THE S. OBERMAYER CO.

Established 1874

2835 Smallman St., Pittsburgh  
Cincinnati St. Louis Milwaukee

Detroit

Syracuse

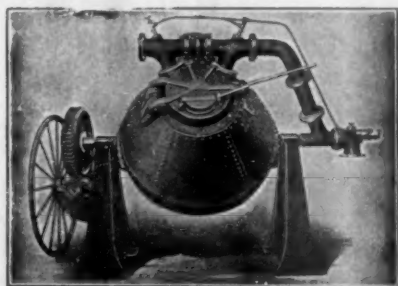
18th and Rockwell Sts., Chicago  
Toronto Denver Los Angeles

**The One Real Solution of Your Melting Problems**

THE

### HAWLEY-SCHWARTZ FURNACE

Enemy of High Cost Melting!



Investigate the Hawley-Schwartz before ordering high-cost electric installations. It eliminates crucibles and crucible troubles—prevents volatilization losses—melts more metal with less men.

CATALOG M-1 SENT ON REQUEST

**HAWLEY-DOWN DRAFT FURNACE CO.**

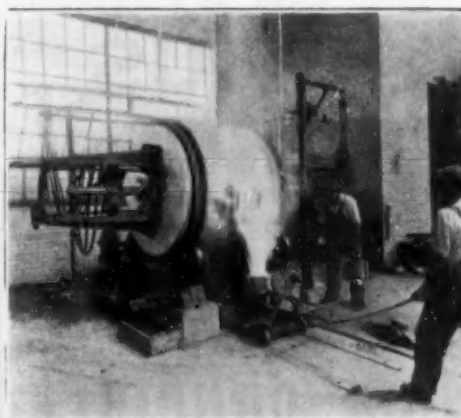
EASTON, PA.

### DETROIT ELECTRIC FURNACES


ARE OF **Improved Design** AND PRODUCE  
**Highest Quality Metal**

AT

**Less Cost**



  
Copper  
Brass  
Bronze  
Aluminum

  
500 Lbs.  
1,000 Lbs.  
2,000 Lbs.  
Capacities



THEIR USE INSURES—**PROFIT**—

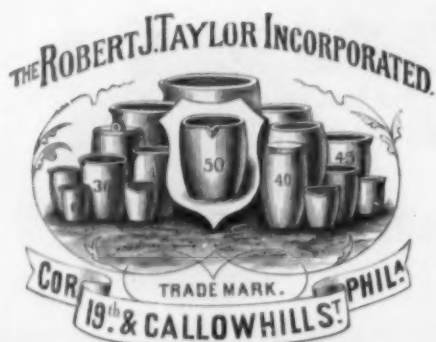
“Detroits” Are Melting Your Metal

WRITE US FOR INFORMATION

**DETROIT ELECTRIC FURNACE CO.**

642 Book Bldg.

Detroit, Mich.



# CRUCIBLES

ROBERT J. TAYLOR

Incorporated

1900 to 1916 Callowhill St., PHILADELPHIA, PA.

Backed by Twenty Years  
Manufacturing Experience

BAY STATE

CRUCIBLES  
RETORTS

SALES OFFICE  
WARREN PRODUCTS CO.  
261 Canal Street, New York  
Works: Taunton, Mass.

## CRUCIBLES

### VESUVIUS BRAND

VESUVIUS CRUCIBLE  
COMPANY

SWISSVALE, PA.

New York Office  
111 Broadway



Net  
\$155.00 f. o. b.  
Branford, Conn.,  
U. S. A.  
Table Top 48"x32"  
Vibrator Platen  
18"x14"

### BRANFORD VIBRATOR CORE BENCH AND CORE BENCH PLATEN

No Foundryman making small cores in quantity can afford to be without this bench in his core shop. For cores for pipe fittings, valves, cocks, hardware, automobile parts and innumerable small casting cores, it cannot be surpassed. Send us your samples and we will give you production estimates.

Full data furnished on application.

Made by the Manufacturers of  
"THE VIBRATOR WITH THE KICK"  
MALLEABLE IRON FITTINGS CO.  
BRANFORD, CONN., U. S. A.





## PECORA HEATPRUF PLASTIC CEMENT

### For Laying-Up, Patching and Protecting Old and New Firebrick

When planning new firebrick construction remember that "a penny saved is a penny earned," and insure the "H. C." of the materials, time and labor you are investing by cementing with Pecora Heatpruf—the most durable "bond," with a well-established reputation for not cracking, burning, melting or crumbling.

This sounds like a whole lot to claim, but substantial endorsement is given by the numbers of experienced foundrymen who swear by Pecora.

Bonding is not, however, the extent of the usefulness of this high-grade refractory. You can give a new lease of life to your old furnaces, crucibles, ladles, retorts, gas producers, cupolas, etc., by filling all the chinks with Pecora and then coating the whole surface with a thin wash of Pecora diluted with water.

Try Pecora in your foundry. Order your first barrel to-day and put the whole place ship-shape for New Year's.

**Pecora Paint Company**

4th and Erie Avenue, Philadelphia, Pa.

Established in 1862 by Smith Bowen—Incorporated 1911

# FLAME BRAND

## HIGH TEMPERATURE CEMENTS

FOR USE IN **All Types of High Temperature Furnaces**

**A "SPECIAL" CARBORUNDUM CEMENT;** already prepared, for Rammed-in-linings. Will give added life to furnace operation and production.

**BLUE "FLAME" FIRE BRICK CEMENT** for use in laying up all makes and shapes of fire brick. Positively will not run out of the joints.

**RED "FLAME" PLASTIC CEMENT;** a carborundum mixture used as a veneer or wash on the face of the fire brick will hermetically seal the joints, also prevents spalling, cracking and checking caused by the abrasion of hot gases.

**WHITE "FLAME" INSULATING CEMENT** is a material to be used wherever high insulating properties are required.

All materials packed and shipped in dry form.

We would be pleased to furnish full information and references upon application.

Write for circular "M."

## KING REFRACTORIES CO., INC.

NEW YORK CITY OFFICE,

707 GREENWICH STREET

MAIN OFFICE and WORKS, 1709 NIAGARA STREET, BUFFALO, N. Y.

OFFICES AND STOCK CARRIED IN PRINCIPAL CITIES

Patent Pending



# WHEN YOU WAKE UP TO-MORROW MORNING AND You Want Your Fond Dreams To Come True

Patented

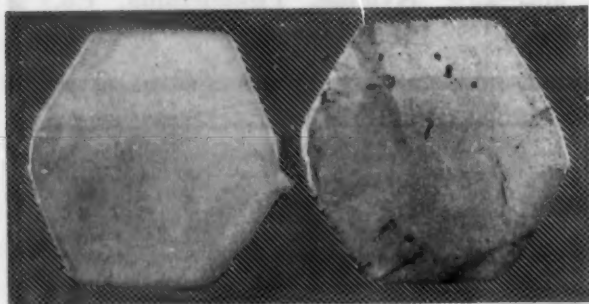


## HOW BORONIC PRODUCTS (all-metal in shot form) WILL HELP YOU

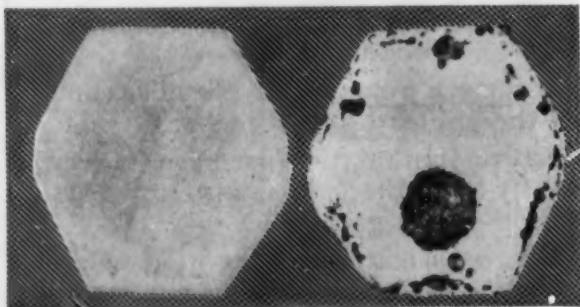
Difference in Internal Structure of Boronized and Unboronized Aluminum  
(Reconstructed by use of No. 14)



Difference in Internal Structure of Copper  
(Reconstructed by use of No. 21)



Difference in Internal Structure of Copper-Nickel  
(Reconstructed by use of No. 22)



TREATED UNTREATED

Address all American inquiries to

**American Boron Products Company, Inc.**  
(SOLE MANUFACTURERS) READING, PENNA., U. S. A.

Foreign Distributors:

Edward Le Bas & Co., London, E. C. (3) Eng.

National Alloys, Limited, London, Eng.

China & Japan Trading Co., Ltd., Kobe, Japan

China & Japan Trading Co., Shanghai, China

OUR LITERATURE MAILED TO EMPLOYER AND EMPLOYEE, WHO AIM FOR IMPROVED PRODUCTS

Mr. Foundryman,  
Mr. Metal-user,  
Mr. Metal-Maker,  
Mr. Metal-Mixer,  
Mr. Metal-Worker,  
Mr. Metallurgist,  
Mr. Metal-Manufacturer:



YOU'LL KNOW that in order to have your nightmares and dreams interpreted, and in order to be fair to yourself, you'll send your troubled dreams to Reading, Pa.—to AMERICAN BORON PRODUCTS COMPANY, INC., FOR THE CORRECT VERSION and THE CORRECT DIRECTIONS FOR YOUR RELIEF.

IN RECONSTRUCTION TIMES, when you'll be forced to employ unskilled help (whether you want to or not), you'll find yourself losing your trade THROUGH INFERIOR METAL CASTINGS—your trade will naturally leave you and go to users of BORONIC ALLOYING METALS—unless you take the cue early and "DO LIKEWISE."

THERE IS NO WAY UNDER THE SUN SO SCIENTIFIC, YET SO SIMPLE, AS BY THE USE OF ONE OR MORE OF OUR TWENTY-FIVE NUMBERS OF ALLOYING, DEOXIDIZING, RENEWING, STRENGTHENING and SOLID-CASTING (all metal, in shot form) BORONIC METALS.

The Mints, the Goldsmith and Silversmith, the Diamond Setter, the Brass, Bronze, Babbitt, Bearings and Bushing manufacturer, the Aluminum, Nickel, Monel Metal, Nickel Silver and Copper manufacturer as well as the Iron and Steel founder, ALL FIND REFUGE and RELIEF THROUGH "BORONICS." The highest class of producers in these lines are THE LARGEST USERS OF OUR BORONIC NUMBERS, and we have been selling them in increasing REPEATS of from one to five tons at a time, DURING THE PAST SEVERAL YEARS.

Our Price Lists and all information regarding our PRODUCTS, as also our samples, will be found at THE SERVICE STATIONS of the Reuben H. Donnelly Corporation (located in the leading American Cities). BORONIC PRODUCTS are advertised in the DONNELLY NATIONAL CLASSIFIED TELEPHONE DIRECTORIES (distributed everywhere). Quickest information is had through these SERVICE STATIONS. Watch for our announcements in FUTURE issues.

DO IT NOW!

To the Metal Manufacturer, or the Individual Mixer of Metals:  
PLEASE USE THIS COUPON.

American Boron Products Co., Inc., Reading, Pa.

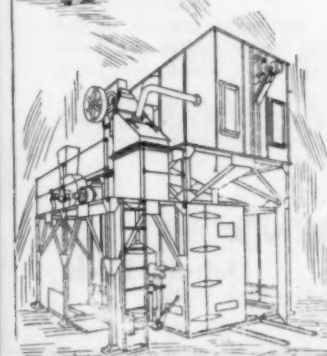
Gentlemen:—Please send me complete details regarding the many ways whereby I can economize by using BORONIC ALLOYING METALS. MI-12-20. My address is:

Name .....

City .....

State .....





## A TYPE AND SIZE FOR EVERY REQUIREMENT

Insures your obtaining the most efficient and economical equipment for your individual requirements—whether large or small.

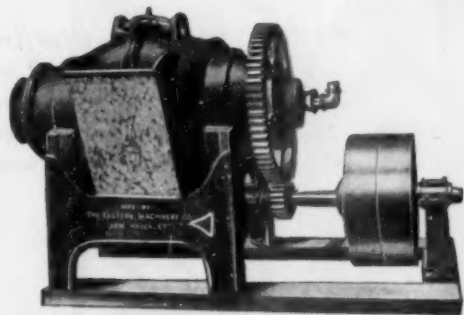
"PANGBORN" activities are devoted entirely to Sand-Blast and Allied Equipment and as much skill and attention given to the needs of the Brass Foundry as to that of the big iron and steel plants.

The hygienic features will appeal to your operator, as they conserve his health and enable him to increase production without discomfort.

LET US TELL YOU MORE ABOUT THEM—A REQUEST FOR INFORMATION CREATES NO OBLIGATION AND WILL BE CHEERFULLY ANSWERED.



## HILL IMPROVED CINDER CRUSHER



WET PROCESS

### THE BEST PULVERIZER

The Hill Improved Cinder Crusher pulverizes and cleans Brass Foundry Cinders, Skimmings, and all materials of similar nature. It does the work in the surest and most economical way.

Simple in design and easily operated.  
Write at once for descriptive circular.

**The Eastern Machinery Co.**  
NEW HAVEN, CONN.

"The Best That Money Buys B. & S. Supplies"

**Benseeco Parting**  
Will Part

**Bensee Core Compound**  
Will Bind

**Blanketine**  
Will check those fumes from Sulphuric Acid Baths

A TRIAL ORDER WILL CONVINCE

**Bennett & Seeley, Inc.**

Foundry and Electro Platers' Supplies and Equipment  
823 RAILROAD AVE., BRIDGEPORT, CT.

"The Best That Money Buys B. & S. Supplies"



Interior View of Saco-Lowell Shops' New Foundry  
Designed by The H. M. Lane Co. in Collaboration with Lockwood,  
Greene & Co.

## A MODERN FOUNDRY

In what we have accomplished lies proof of the superiority of our service in the field for foundry engineering.

The new foundry of the Saco-Lowell Shops, like our other designs and layouts, is the result of a very careful study of their casting requirements. It comprises fifty-six independent molding units, each served by individual sand and material handling plants. The area of the foundry floor is 60,000 square feet, and the area of the service and melting units is approximately 40,000 square feet. The above photograph illustrates vividly the advantage of scientific study of lighting conditions, and perfect ventilation will be secured by the use of a Pond roof and the introduction of shake-out holes in the floor over the basement, thus providing a constant flow of air in the vertical plane.

Our reputation as foundry engineers is built upon foundations of accomplishment. To our many friends in the trade our name carries with it distinction and a service that is unexcelled in its line; to those whom we have not yet served we point with pride to the many foundries in different parts of the country which we have engineered to a successful conclusion.

If you contemplate a new foundry or an addition to your present plant, we would suggest that now is a good time to have your plans prepared, so that you will be in position to award contracts at the most opportune time. We will be glad to have a representative call to talk things over at any time you may desire.

## The H. M. LANE COMPANY

Owen Building,

Industrial Engineers and Foundry Specialists

Detroit, Mich.

Canadian Office: THE H. M. LANE CO., Ltd., LaBelle Block, Windsor, Ont.

## MOTT SAND BLAST MFG. CO., Inc.

Chicago, 24 S. Clinton St.

Brooklyn, 2 Frost St.

This newly constructed Sand Blast Barrel (Type I) demonstrated at the Foundrymen's Convention made a big hit with the visiting foundrymen.



Write to us for circular and get all information regarding this very efficient yet not costly machine.



## The Standard "Radial Blast" Sand Blast Barrels

One of our customers recently cleaned 2500 lbs. of heavy Bronze Castings, some cored, averaging from 40 to 60 lbs. each, in our No. 3, 36" x 44" "Radial Blast" Barrel, in 20 minutes, using 70 lbs. pressure. This is only one sample of the speed of our "Radial Blast" Barrels.

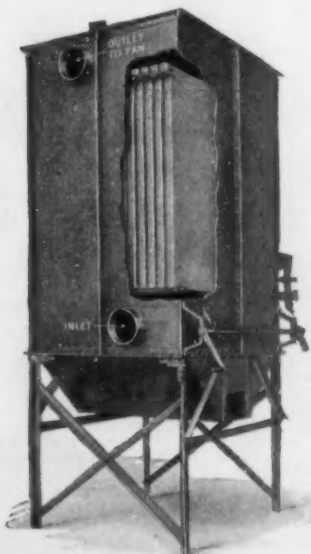
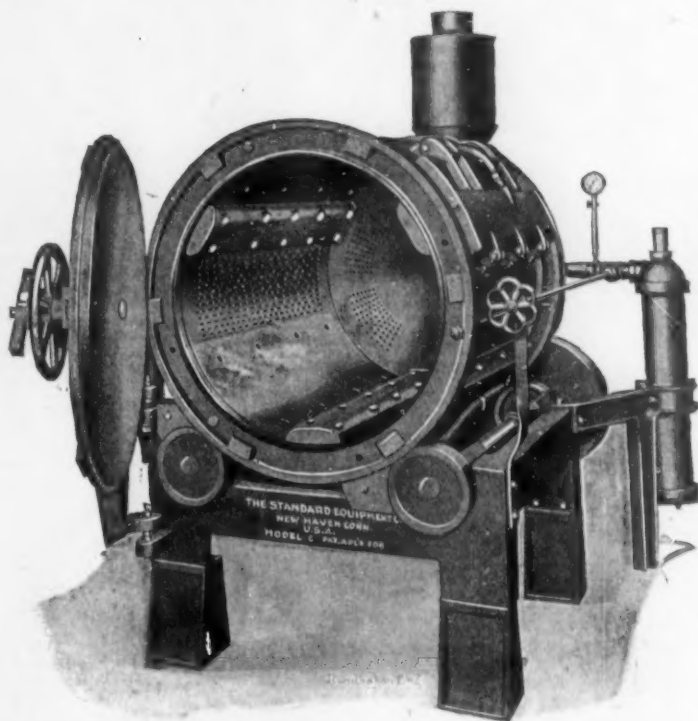
Did you see it in operation at Columbus?

Four sizes, 24" to 60" diam.

OUR NEW REVISED BULLETIN "SRB"  
WILL GIVE YOU FULL PARTICULARS.

**The Standard Equipment Co.**

New Haven, Conn.



"American" Cloth Screen Dust Arrester

## CATCHES ALL THE DUST Conserves Heat

Dust deposits upon the cloth screens.

Clean air only passes through to the fan.

A jarring mechanism shakes off the dust into the hopper for removal.

Why waste your factory heat in winter by exhausting outside, when with this arrester you can discharge from the fan right back into the plant?

Extensively used in connection with Sand Blast Equipment, Tumbling Mills, Grinders, Etc.

**AMERICAN FOUNDRY EQUIPMENT CO.**

THE SAND MIXING MACHINE CO.

THE RICH LINE THE BUCH LINE

366 MADISON AVE., NEW YORK CITY





SAND BLASTING FOR SMALL PIECES

The finish of any article, whether painted or plated, is vastly improved and the finish is more permanent where sand blasting has prepared the surface first.

**A VERY SMALL QUANTITY OF SAND** is required to operate the machine. It is **USED OVER and OVER.**

### SAND BLAST FINISHES ARE ALWAYS UNIFORM

Sharp, clean cut letters on electric light bulbs, bottles, etc., produced rapidly. A clean, dry process.



## FROSTING and MAT FINISHING

### And Quicker Plating Results

You simply hold a piece of work in the hand under the nozzle which is stationed inside the cabinet. The sand is blown in a steady stream onto the article, producing a fine, silky mat finish or a rough, frosty effect, just in accordance with the grade sand you put in the machine. You can change the sand as often as you please—only a few seconds to do it. Start and stop the flow of sand instantly by pressing the foot lever.

No matter what line of goods you make there is use for the sand blast. There is an improvement you can make in the appearance of your goods or in the method of producing the finish. Bottles and containers may be marked with letters and designs—electric light bulbs also—completely or partially frosted, a fine silky effect or a very rough frosty appearance. Very simple and easily understood, economical and effective.

The **SAND BLAST PROCESS** is **CLEAN** and **DRY** and a **PLEASANT** one withal. **NO** experienced help is required for the finest results. The dust is all confined inside the cabinet so that the operator need **NOT** wear a protective device for the eyes, mouth or nose. This applies, however, **ONLY** to the **CABINET TYPE** sand blast. The **HOSE TYPE** machine is supplied with the **HOSE FEED** which enables the operator to work on **LARGE PIECES** and in **ANY** direction. Here the operator should use our protective cap.

And then the **COST** is **NOT GREAT**—**ANY** good tool costs money, but if it **INCREASES PRODUCTION** or **DECREASES THE COST OF PRODUCTION** its cost is **INSIGNIFICANT**. The most expensive outfit we supply costs a whole lot less than the price of an ordinary lathe and the possibility of profits from its use is far and away **GREATER** than is the case of machine tools found in every shop and which originally cost **MANY TIMES** the amount we ask for these.

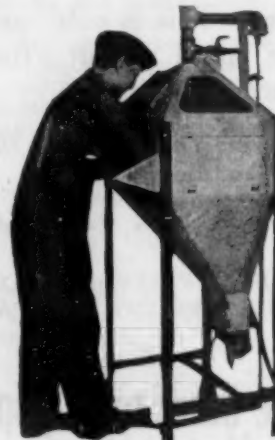
All the dust of the sand blasting operation is confined inside the cabinet. You watch the progress of the work under the nozzle through the front glass.

An efficient means of frosting and mat finishing on metals, glass and other materials; cleaning castings and patterns; stencilling letters and designs; and properly surfacing articles which are to be plated and polished. Does away with scratch brushing and the use of dangerous acids.

Inexpensive to install, rapid in action and easily understood and operated by anyone.

**WE ALSO HAVE A MACHINE WITH A HOSE FOR LARGE WORK—**

May be mounted with motor and wheeled about. To confine the dust the work may be placed inside a large box or case and the hose inserted through an opening in same.



Sand Blast Operating for Frosting and Mat Finishing on Metals and Glass, Gold, Silver, Brass, Aluminum, Gas and Electric Fixtures, Bottles, Electric Light Bulbs, etc., and Cleaning Castings and Patterns.

The most inexperienced person in your shop can operate these sand blasts—Nothing to get out of order. Just plain, simple machines that can be understood at a glance. You can't spoil the work by leaving it in the machine too long. You get the same effect every day—always smooth and uniform. Only a very little power required and very little sand—No expense to speak of but a great deal of production. No factory is complete without a sand blast.

Rust and corrosion may be removed, windows frosted, signs of glass or metal made, black-board surfaces restored and in fact wherever these sand blasts are used new uses are constantly suggesting themselves.

The **SAND BLAST** can be used on a wide range of materials including steel, iron, brass, copper, gold, silver, and other precious metals, glass, ivory, rubber, fibre, celluloid, tortoise shell, wood, etc.

GET THE CATALOG

**LEIMAN BROS. 81-J WALKER ST., NEW YORK**

**OVER 30 YEARS IN BUSINESS**



## Dreaded Sand Blasting Problems Become Simple to the Man Who Owns a

### NEW HAVEN SAND BLAST BARREL

Have you ever seen one at work under shop conditions?

Go into the shops that use the "New Haven" and investigate it thoroughly. You will find that any castings, stampings, forgings, etc., which can be handled by the barrel method are cleaned better, quicker and at lower cost than is possible with any other equipment.

You will learn that the "New Haven" is the one truly successful and the *most widely used Sand Blast Barrel*, that its operating cost is low, that it stands up astonishingly well under the hardest kind of service, making repair bills small and eliminating loss of time from shutdowns.

You will find that the "New Haven" is the only really self-contained sand blast barrel, in which the abrasive material does not leave the inside of the barrel but is used over and over again until worn out, when it is automatically removed.

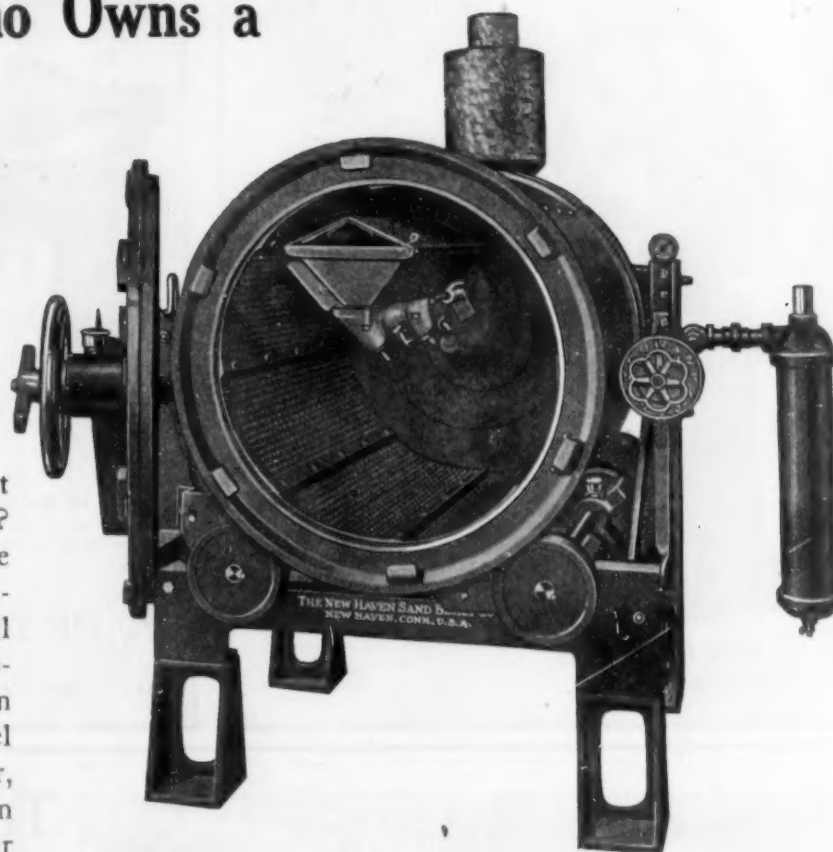
These and other features and facts will convince you that the "New Haven" is the barrel for *you*, but to clinch the argument we will put a machine into your own plant on approval and let you give it a good tryout, without expense to you if it fails to substantiate all our claims.

Doesn't that interest you? Why not dictate that letter to us now, before you forget it?

*Catalog "SB" now available*

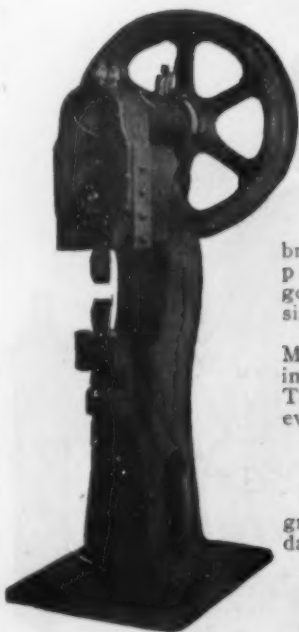
## NEW HAVEN SAND BLAST COMPANY

New Haven, Conn.



## TURNER MACHINE CO.

3633 North Lawrence Street  
PHILADELPHIA, PA.



Send for  
Catalog M2

### TURNER PATENT SPRUE CUTTER

WITH BELT DRIVE

Strong, rigid, durable;  
large capacity, good ad-  
justment, good frame.

### TURNER PNEU- MATIC MOLDING MACHINE

Designed especially for  
brass foundries making  
plumbers' and electrical  
goods, etc. Built in three  
sizes.

Our Hand Power Molding  
Machines are highly regarded  
in numerous large foundries.  
This new pneumatic type is  
even better.

### AUTOMATIC COCK GRINDER

With one operator will  
grind 400  $\frac{3}{4}$ -inch cocks per  
day.

### SAND SIFTER AND MIXER

Made with single or double  
heads. Requires only  $\frac{1}{2}$   
horsepower. Soon pays for  
itself.

## Metal Spinning Lathes

Tools, Chucks and Accessories for Round and Oval  
Work, Metal Band Saw and Circular Saw Machines



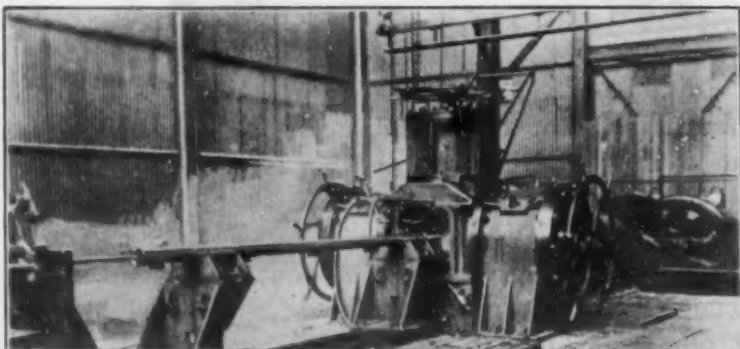
22 in. Oval Spinning Lathe with  
Compound Slide-Rest

Sizes of the regular machines run from 15" to 26"  
swing and the extension or gap type lathes will be  
furnished in 22" x 44" swing size, and 27" x 60" swing  
size.

## P. PRYIBIL MACHINE CO.

ESTABLISHED 1862

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## Tube Rolling Mills

(PATENTED)

for seamless Copper and Brass, rolling tubes  
of from  $1\frac{1}{4}$ " up to 12" outside diameter.  
Will change, for instance, a billet of  $1\frac{7}{8}$ "  
diameter and 3 feet length in warm condition  
into a tube 9 feet long in 15 seconds. Ca-  
pacity at least 70 billets—2,000 pounds—  
per hour.

New principles in other equipment for  
complete plants.

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Consulting Engineer

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Erie, Pa.

## Mg 99% Pure Metallic Magnesium

THE NORTON LABORATORIES, Inc.

41st St. and Madison Ave., N. Y. Lockport, N. Y., Nashua, N. H.  
British Thermit Co., Ltd., 49 and 51 The Albany, Liverpool, England  
Authorized Representative in British Isles

USE ONLY THE  
CHAS. K.  
SCHWEIZER CO.

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Waterback and Plain

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ST. LOUIS, MO.



SOLDER, BAB-  
BITT, LINO-  
TYPE, TIN AND  
LEAD MOULDS.

Send your inquir-  
ies on special de-  
signs.

## HOEVEL SANDBLAST MACHINES

Patented.

HOEVEL MANUFACTURING CORPORATION

Controlled by L. O. Koven and Brother  
164 Ogden Avenue, Jersey City, N. J.  
Cleveland Office, 503 American Trust Bldg.

Dustless Sandblast Cabi-  
nets, Rotary Table, Revolv-  
ing Barrel Sandblast Ma-  
chines, Hose Sandblast and  
all other Sandblast Equip-  
ment.

## "LACKO"

Parting—For the Foundry

A high grade Parting, manufactured from Tripoli flour  
and the best grade core oil, which will stand the test.  
Send in your order for a trial barrel.

RELIABLE PARTING CO.

Ottawa, Ill.



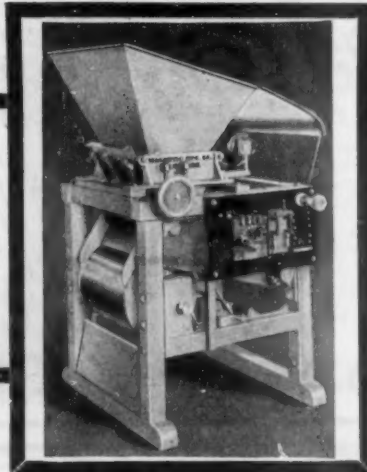


**THE SCOOP CONVEYOR**  
**OVER 2000 IN USE**  
 SAVES TIME AND LABOR — ENABLES MEN TO  
 WORK EFFICIENTLY IN UNLOADING OR LOADING  
 CARS OR TRUCKS. REPLACES FROM 6 TO 12 MEN

Keeps Equipment Moving  
 Saves Car Demurrage

WRITE FOR  
 LITERATURE  
 PORTABLE MACHINERY CO.  
 PASSAIC, N. J.

R. & P.  
 1880



## 100% Removal of Iron

### The Type "L" Magnetic Separator

is not to be confounded with the drum type machine using permanent or revolving magnets. There are no sliding electrical contacts.

The type "L" will handle from two to three times as much material as any machine of equal size.

The magnets are so placed and designed that they REMOVE EVERY TRACE OF IRON AND STEEL and make a clean-cut separation between the brass chips, turnings or other material and the iron and steel.

Bulletin "L" gives you all the particulars in a most interesting way. Have you a copy?

### MAGNETIC MANUFACTURING CO.

755 Fourth Avenue

Milwaukee, Wis.

Post Van Der Burg Co., New York, Export Representatives



The  
Scleroscope  
Set

## HARDNESS TESTING

is now done by the scleroscope almost exclusively. The advantages gained are so positive that few firms are without it today. Send for our booklet, free.

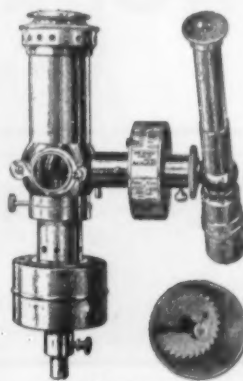
### The Pyroscope

is an optical instrument that has solved many heat indicating problems in hardening, forging, founding, etc. Inexpensive, simple, quick, constant. Pamphlet free.

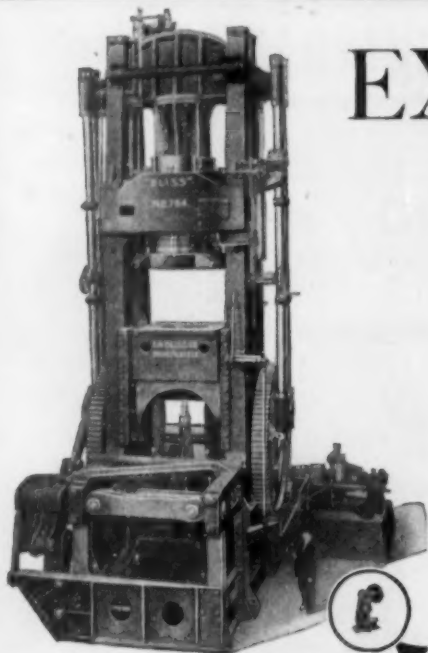
Localized Hardening—Selective Carburizing  
 by the Shore Process

### THE SHORE INSTRUMENT & MFG. CO., INC.

Van Wyck Avenue and Carll Street, Jamaica, N. Y.  
 Agents in all foreign countries



Pyroscope



## EXTREMES MEET

We're showing you the "biggest and the littlest" here side by side just to point to a fact—that every power press need of the sheet metal manufacture is covered by "BLISS" lines. The tiny press in the circle (not so tiny at that for it weighs 250 lbs.) is a Bench Press suitable for punching, blanking and forming light work. The big one that towers above its operator is a **Bottom Slide Toggle Drawing Press No. 764** especially adapted for producing large, heavy, steel barrels, etc.



WE BUILD BOTH THESE PRESSES



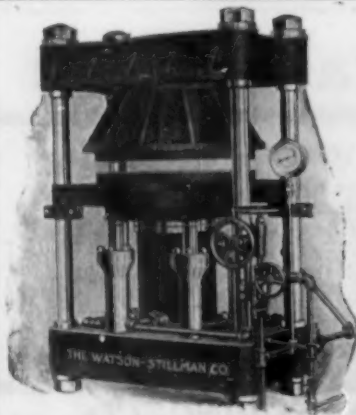
### E. W. BLISS COMPANY

Main Office and Works: BROOKLYN, N. Y., U. S. A.

CHICAGO OFFICE  
People's Gas Building  
LONDON, S. E., ENGLAND, Peacock Street, Blackfriars Road

DETROIT OFFICE  
Dime Bank Building  
PARIS, FRANCE, 100 Boulevard Victor-Hugo St. Ouen

CLEVELAND OFFICE  
Union Bank Building  
1920



## HYDRAULIC PRESSES

For Die Sinking, Pressing, Embossing, Sheet Metal Forming, Drawing, Cupping Flanging, Bending and Extruding

Two of these presses are shown here. One at the right is a 1000 ton standard die press, designed to be used with an independent pump or accumulator system. The other is a press arranged to draw automobile rims from sheet metal. Our line of presses contains many machines built for the working of metals. We build everything necessary to equip complete hydraulic plants—pipe, valves, pumps, accumulators, packing, etc.

Write for Catalogs

The Watson-Stillman Company



196 Fulton St., New York  
Chicago, McCormick Building 359



## BRASS AND COPPER ROLLING MILL MACHINERY

And Special Machinery of Any Description

THE TORRINGTON MANUFACTURING CO.,

Torrington, Conn., U. S. A.



### AMES SWORD COMPANY

CHICOPEE, MASS.

Manufacturers of

ENDLESS SEWED POLISHING BELTS

Correspondence Solicited Discounts Quoted

### Polishing Meal and Polishing Leather

FOR DRY BARREL TUMBLING

The Peckham Manufacturing Company

234 South Street

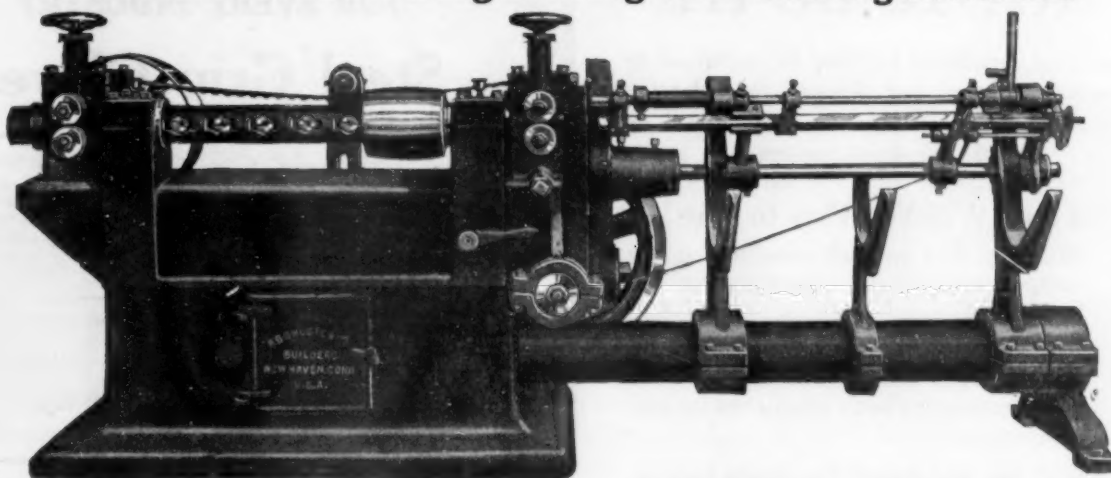
Newark, N. J.



## EVERY KINK TAKEN OUT

on our

### Automatic Wire Straightening and Cutting Machine



No matter what kind of wire you use, this machine will take it from the coil, straighten and cut it to accurate lengths at high speed. The wire will be PERFECTLY STRAIGHT, and each length will be an EXACT DUPLICATE of the preceding one.

We make it in a number of sizes and lengths, and shall be glad to send full particulars and catalogue on receipt of specifications of the diameters and lengths to be handled.

**THE F. B. SHUSTER CO.**

NEW HAVEN, CONN.

Formerly John Adt & Son

Established 1866

*Also makers of Riveting Machines, etc.*

## DROP PRESSES

FOR ALL PURPOSES

OUR SPECIALTY —

**THE PECK AUTOMATIC  
DROP LIFTER**

Can be attached to Hand or Foot  
Drops and greatly increase the output.

**MINER & PECK MFG. COMPANY**  
DERBY, CONN.

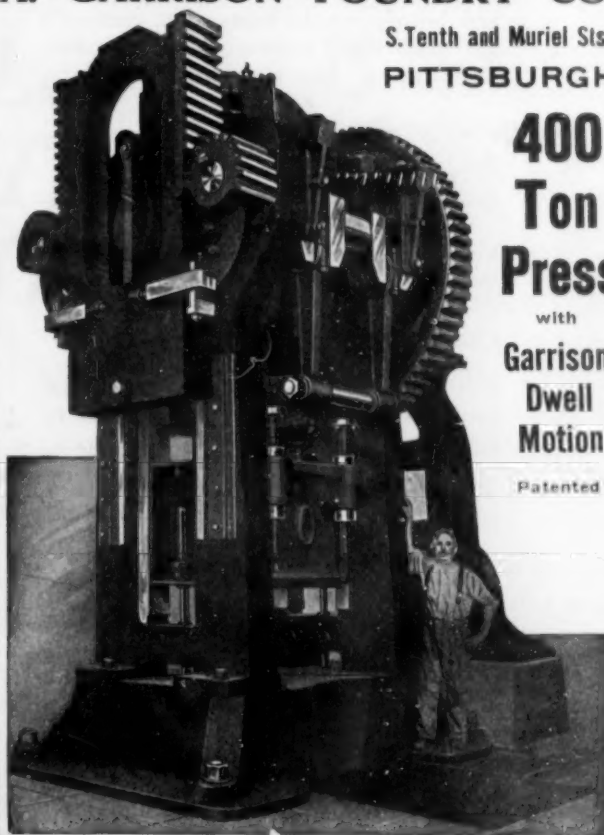


**NORTHERN ENGINEERING WORKS, DETROIT, MICH.**

## A. GARRISON FOUNDRY CO.

S.Tenth and Muriel Sts.,  
**PITTSBURGH**

**400  
Ton  
Press**  
with  
Garrison  
Dwell  
Motion  
Patented



## CAN YOU AFFORD NOT TO DO IT?

*Industrial conditions will not be stabilized by a single influence, but through the adoption of a program of constructive betterments by each industrial concern.*

### What Part Will You Play In This?

Will you find yourself outdistanced by competitors who are organizing for the future?

Will you find yourself without adequate and accurate cost knowledge as your guide in meeting both retrenchment and competition?

Will you find when conditions become normal that you can only secure a proportionate production from your capacity, due to failure to plan and prepare?

### Why Not At This Time—

1st—Consider the prospects and demands of the future and prepare to take your place among the leaders?

2nd—Arrange for securing costs which will not only record but control?

3rd—Control production by setting standard hourly productions, and currently and graphically showing actual productions against these standards?

### With So Much At Stake—

Even if it does take time and effort;  
Even if it does require a reasonable investment;  
Even if it does necessitate planning;  
Even if it does demand education;

### Can You Afford NOT to Do It?

Our service will facilitate the making of your betterment program, and assist in inaugurating the plans decided upon.

*Have your Secretary write us now for our Blue Book Series*

WE CAN DESCRIBE OUR PLAN BRIEFLY

**C. E. KNOEPPEL & CO., INC.**

*Industrial Engineers*

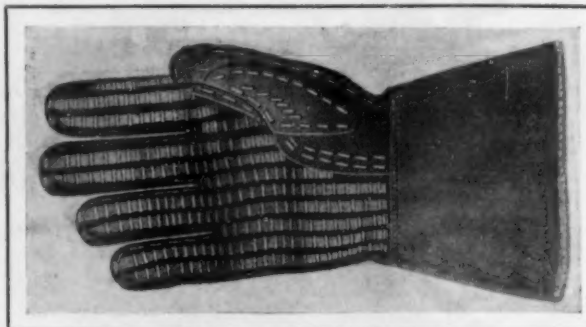
52 Vanderbilt Avenue

New York

**"Knoepfel Organized Service"**

## LA FRANCE SAFETY DEVICES FOR EVERY INDUSTRY

### Steel Grip Gloves



In the metal industry are found operations exceedingly dangerous to the hands, chipping, grinding, handling heavy materials such as bar iron, cast iron, or sheet steel, or other material with sharp and ragged edges. Aside from the discomforts which these dangers cause the workmen, they frequently retard production.

LaFrance Steel Grip Gloves will overcome these conditions. The palms, fingers and thumbs are reinforced with steel rivets, clinched so they cannot hurt the hands or wear rough. The seams are sewn with steel which will not rip, tear, snag, rot or burn, as is the case when seams are sewn with ordinary thread. The gloves themselves are made of tough, long wearing chrome tan leather, which with the steel reinforcements, presents two or more distinct wearing surfaces.

Safety engineers everywhere approve these gloves, and recommend them for speeding production.

Write our nearest branch office for complete information in regard to this and other La-France Safety Devices.

**AMERICAN LA FRANCE FIRE ENGINE COMPANY, INC.**

ELMIRA, N. Y.



New York  
Philadelphia  
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Los Angeles

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San Francisco

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## McDonald-Churchill Corporation

Industrial Engineering Service

103 Park Avenue

New York

*A Service* for the practical and helpful solution of Administrative, Managerial and Operating problems of industry.

Our extensive experience as executives and consultants qualifies us to assist intelligently and with mature judgment in Increasing Production, Reducing Costs, Stabilizing Operations and Improving Financial Conditions.

There's a  
*Tycos*  
or a  
*Taylor*  
temperature  
instrument  
for  
every purpose



*Taylor Instrument Companies*  
ROCHESTER, N.Y.

# Let Them Go

LET them sweep themselves out—those poisonous brass fumes. They'll do it if you give them a chance.

This booklet tells how the air of a brass foundry may be kept clean and fresh at all times. Write for a copy—free.



**DAVID LUPTON'S  
SONS COMPANY**

Agate St. & Allegheny Ave.  
Philadelphia, Pa.

*Specialists in daylighting and ventilating equipment for maximum production*

## LIQUID SULPHUR

(The New Oxidizing Solution)

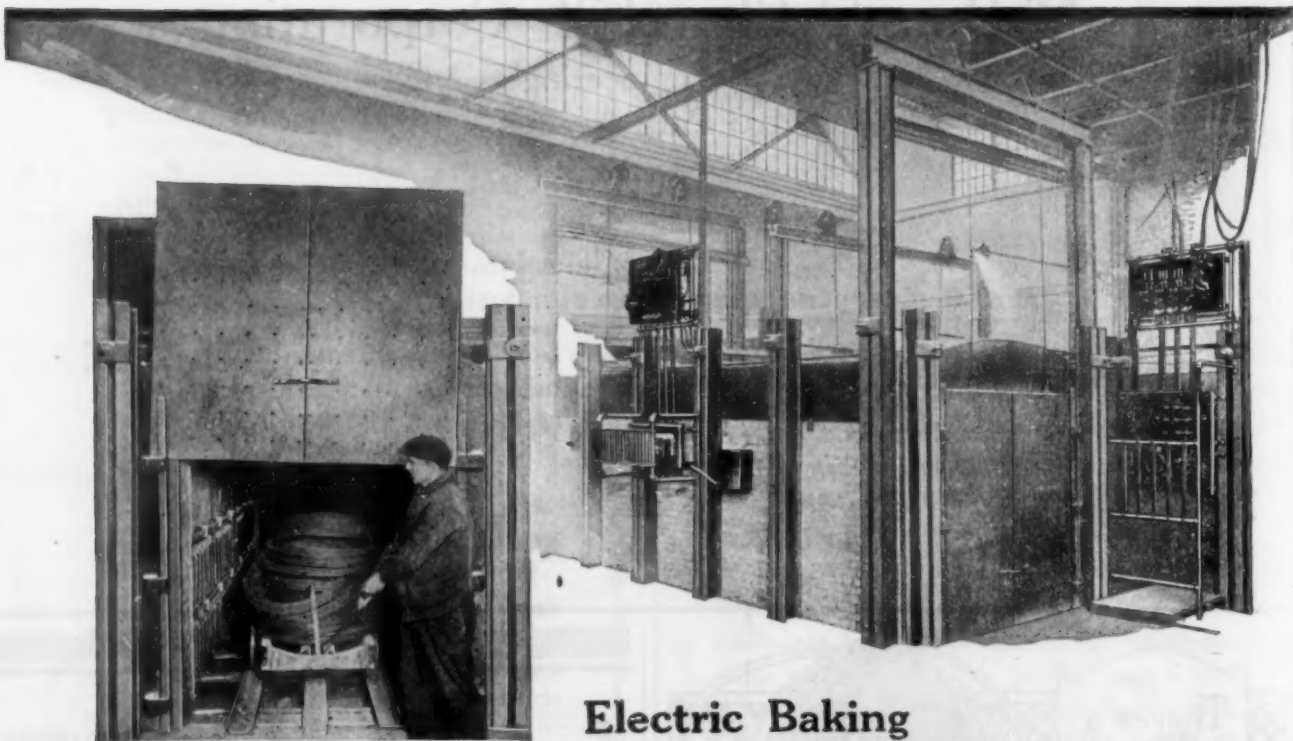
will advance in price Jan. 1, 1921, to  
\$1.65 per gallon in single gallons.

Order now your year's supply.

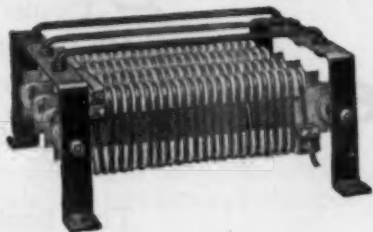
**SULPHUR PRODUCTS CO.**

Greensburg, Pa.

*Electric heat, ever ready to serve and easy to control,  
reduces to a minimum the rejections in industrial baking*



### Electric Baking is proven economy



**T**HE use of electric heat increases the daily output of the industrial oven without increasing cost.

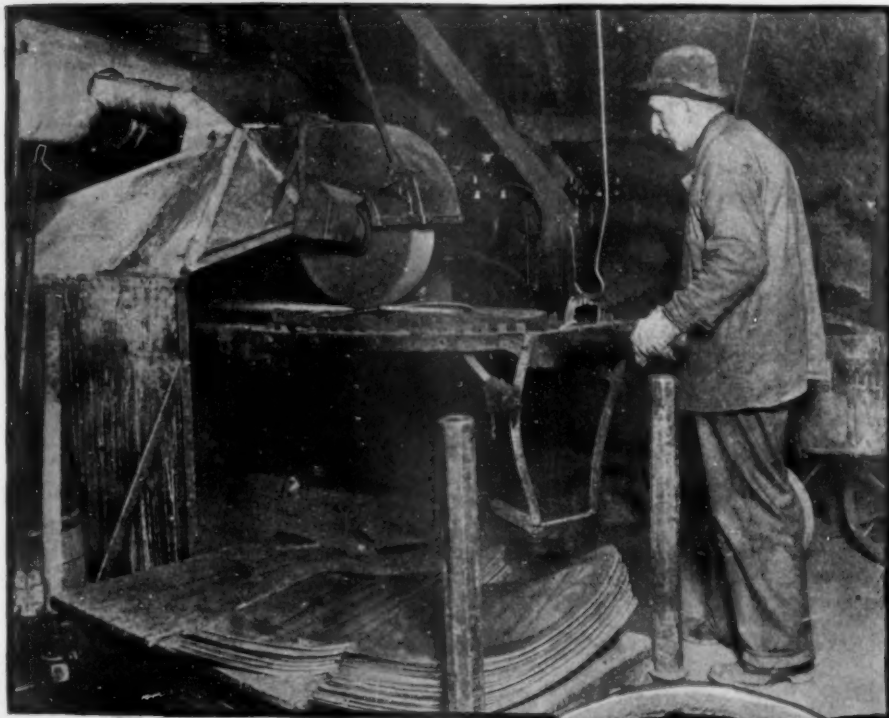
In wire drawing plants the use of electric heat is saving dies. Before baking, the wire is dipped in acid and then in lime to neutralize the acid. When baked in a fuel oven a hard coating forms which acts as an abrasive, wearing the dies rapidly. Electric baking however, leaves a soft coating which acts as a lubricant when the wire is being drawn through the dies.

The many other advantages of the electric oven—heat furnished by the throwing of a switch, practically perfect temperature control, and the easy duplications, day after day, of desired results—all serve to emphasize its value to industry.

What G-E heating engineers did in this plant, they are ready to do for other industries.

**General Electric Company**  
General Office  
Schenectady, N.Y. Sales Offices in  
all large cities





## Alundum Grain and Production

The polisher and the manufacturer have learned that the initial cost of Alundum Grain is a very minor factor in figuring production.

In polishing plow parts the polishing wheel is put to considerable severity. The flinty scale left after rough grinding must be removed without drawing the temper of the steel. "Alundum" insures the polisher a fast cutting grain, free and cool, which will not check the work.

Fewer "set-ups" are required with Alundum Grain and more pieces can be polished with each wheel. The consequence is a saving in operator's time and a faster production. Production considerations together with the uniformity of surface which the name "Alundum" insures makes this polishing grain the operator's ideal medium.

## NORTON COMPANY

Worcester, Mass.

Electric Furnace Plants,

Niagara Falls, N. Y., Chippawa, Ontario, Canada

New York Store

11 N. Jefferson St.

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Chicago Store

Detroit Store: 73 W. Congress St.



## EXCELSIOR No.25 DOUBLE SPINDLE BALL BEARING POLISHING LATHE

PATENTED

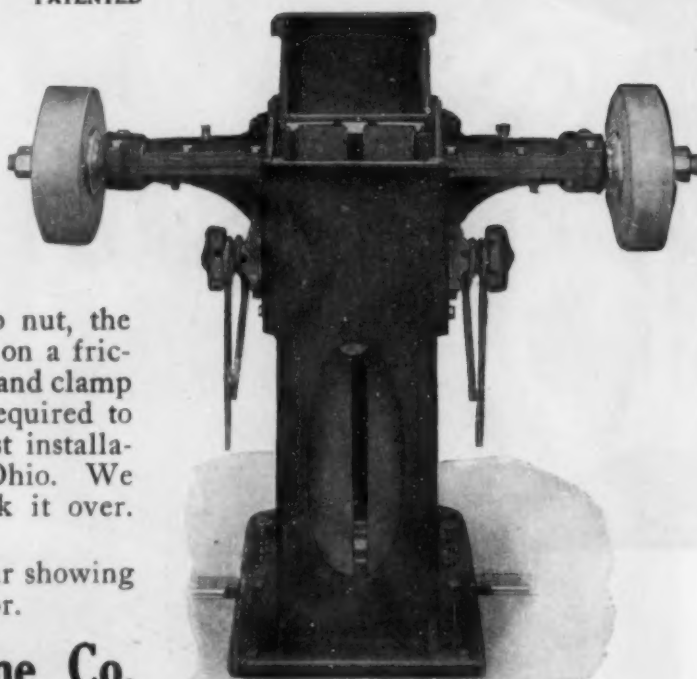
This view shows the front plate removed and the top dust cover raised. Note the plain design. No loose pulleys, no friction clutches, no belt tightener, no dust carrying belts or electric apparatus to give trouble. Short, 4" endless belts are all we use. Just raise the spindle head with the eccentric provided and we guarantee no polisher can stall the wheel.

To stop the wheel release the clamp nut, the head will drop and the pulley will rest on a friction block, stopping the spindle instantly and clamp same so that no bars or wrenches are required to remove or tighten the wheels. Our last installation is 45 lathes in one shop in Troy, Ohio. We have many using 20 machines. Think it over. There must be a reason.

Write us and we will forward circular showing this machine in use on any kind of a floor.

**Excelsior Tool & Machine Co.**

East St. Louis, Illinois



# T·N·T·

After all T. N. T. is a charitable means of destruction. You see, it destroys instantly—no suffering.

But dust-filled air is a slow poison—it saps vitality of workmen and eventually destroys efficiency.

Our Dust Collecting Systems protect men and maintain steady, efficient work wherever it is adopted.

Write.



**CLEVELAND  
BLOW PIPE AND  
MFG. CO.**

6950 Kinsman Rd.,  
CLEVELAND, OHIO

**E. Reed Burns Supply Co.**

MANUFACTURERS

PLATERS and POLISHERS SUPPLIES

40 and 42 Withers Street  
21-27 Jackson Street

**BROOKLYN, N. Y.**

BRANCH

CHICAGO

Send for Our Silent Salesman  
Prices Talk Louder Than Words



**ECONOMY ADJUSTABLE  
HOOD**

Operates with much less suction and is more quickly adjusted and never in way of operator—

**SAVES POWER and TIME**

State height of spindle from floor and size of largest wheel used. We'll send one "on trial." If not satisfactory—return at our expense. We design and install Complete Dust Collecting Systems—can rid your polishing and buffing department dust.

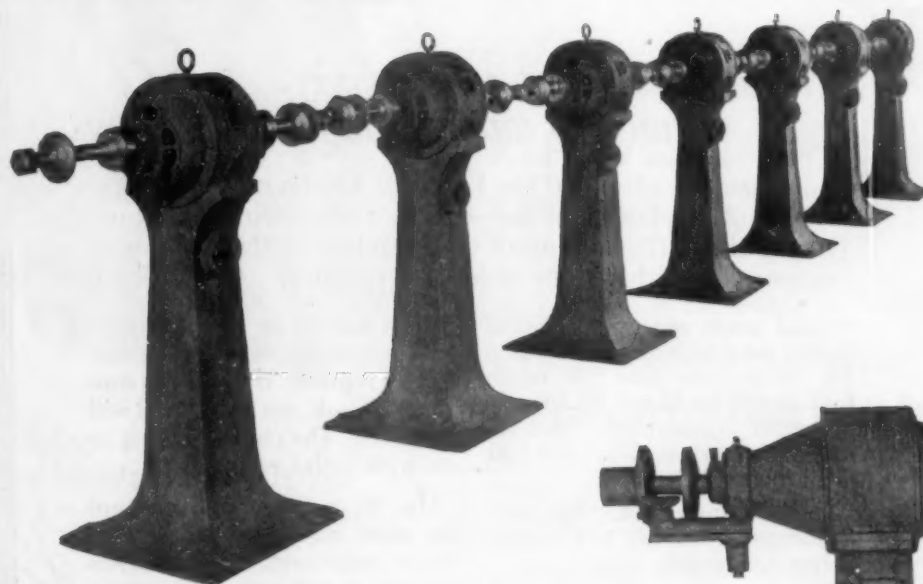
**KIRK & BLUM COMPANY**  
High Grade Dust Collecting Systems  
CINCINNATI, O.



# EAGER

## BALL BEARING

### MOTOR BUFFING AND POLISHING LATHES



Eager  
A-C  
Motor  
Grinder

We design and build all the motors ourselves in our own factory, which enables us to produce machines that give much better service than "assembled" machines, made up of bought motors and parts.

Eager installations made 15 years ago are still in everyday use, the machines showing no appreciable signs of wear.

Eager lathes have extra large arbors and bearings, which eliminate vibration. No starting device is necessary with our A-C motors. The large sizes are equipped with specially designed oil-immersed switches, enabling the start to be made with a minimum flow of current and without disturbing the line voltage.

It will be well worth while to consult us regarding your requirements.

Sent on request—

Catalog A-100, giving dimensions, speeds, etc., of EAGER Motor Buffing and Polishing and Grinding Lathes.

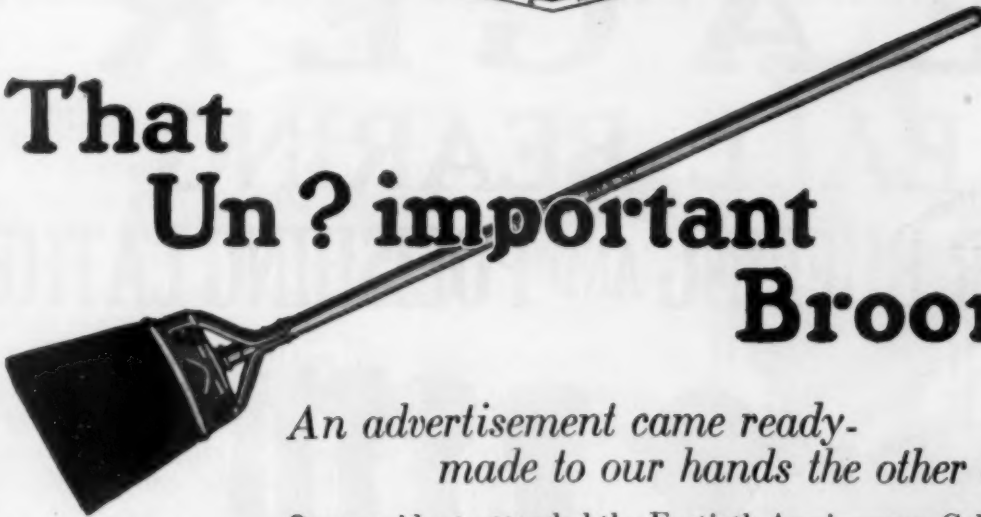
Catalog A-200, describing EAGER Low Voltage Motor Generators, AC and DC Generators, Tank Rheostats, etc.

## The EAGER ELECTRIC COMPANY

Manufacturers  
Watertown, N. Y.

OSBORN

# That Un ? important Broom!



*An advertisement came ready-  
made to our hands the other day*

Our president attended the Fortieth Anniversary Celebration of a Cleveland machine-tool manufacturing company. During the gathering one of the founders of the forty-year company told this story about his partner.

"Some years ago a salesman of boiler compound called upon Mr. W. to show him how much fuel would be saved by the use of boiler compound. Mr. W. asked the salesman, 'Do you sell brooms'?"

"The salesman said, 'No', and continued with his talk about boiler compound.

"After listening to the argument Mr. W. again asked, 'How about brooms—do you handle them'?"

"After he had pressed this question several times, the salesman finally replied, 'Why do you continue to ask me whether I sell brooms? They have nothing to do with boiler compound.'

"Mr. W. replied, 'Brooms are far more important to us than boiler compound. *It costs us five times as much each year to keep the factory clean as it does to pay our coal bill.*'"

*The moral is obvious.* Osborn's part is to build longer-lived brushes and brooms in design and of material which increases the cleaning efficiency of your sweepers.

Let us support these contentions with some almost startling cost comparisons furnished us by our customers. Just say, "We want to cut our cleaning costs."

Because Osborn makes every individual type of industrial brush—350 in all, making use of 137 kinds of material, Osborn can always deliver the right article for any particular purpose.

To make Osborn quality absolutely sure, Osborn maintains, what we believe to be, the only testing-and-experimental laboratory in the broom-and-brush industry.

## THE OSBORN MANUFACTURING COMPANY

INCORPORATED  
CLEVELAND  
Milwaukee

New York  
Chicago

Detroit  
San Francisco

OSBORN





*This Man is  
Authority on  
Polishing Wheels  
and he's strong for*

**EAGLE  
BRAND**



**Bull Neck Leather Wheels  
Sheepskin Leather Wheels**

*One Good Turn  
Deserves Another*

We manufacture items given below and carry in stock everything pertaining to the plating and polishing industry.

**Eagle Brands Canvas Polishing Wheels**

- " " Bull Neck Leather "
- " " Sheepskin "
- " " Spanish Felt Polishing Wheels
- " " Walrus Leather "
- " " Sewed Pieced Bleached Buffs
- " " " " Unbleached "
- " " Whole Disc Loose Buffs
- " " " " Sewed "
- " " Cotton Flannel Buffs

**Service Brand Canvas Polishing Wheels**

- " " Colored Cloth Buffs
- " " Printers Ink Cloth Buffs

Special Buffs made to order of any material, weight or diameter.

We want you to know why our Bullneck and Sheepskin Leather Wheels, why our Canvas Wheels and Buffs are beginning to be recognized as being superior to any other yet attempted to be manufactured.

We want you to know that into our products are built twenty long years of experience, from the practical standpoint, that we are planning a record output of both Polishing Wheels and Buffs, and that we are determined to give you the greatest value in your purchases of Buffs and Polishing Wheels in our offer of Eagle Brand products.

Remember whether Polishing Wheel or Buff if it bears the "Eagle Brand" it represents the highest standard of wheel manufactured.

**American Platers' Supply Company**

MANUFACTURERS OF PLATERS' AND POLISHERS' SUPPLIES

212-214 W. Kinzie Street

Chicago, Ill.

## Polishing and Buffing Compositions

We take pleasure in announcing that we are handling the complete line of the well-known "ACME" brand buffing and polishing compositions, including Acme White Finish, Lime Compositions, Tripoli, Crocus, Emery Paste, Emery Cake, Buffing Tallow, Rouge and Special Compositions for all industries.

"ACME" brand Compositions are the last word in quality and economy proven by their over fifty years of service.



ACME WHITE FINISH

"ACME WHITE FINISH." Known the world over as the "Acme of perfection" of lime compositions. Acme White Finish produces the highest polish on nickel, copper, brass, bronze and other metals and stands in a class by itself as a coloring composition.

"ACME" BRAND. Tripoli Compositions are made in various grades to meet the proper consistency and fineness required for the various operations.

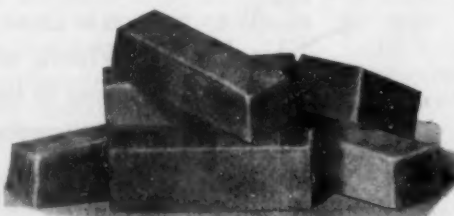
This represents the highest grade Tripoli composition to be had. It is a fast and clean cutter. This composition wears longer on the buff, runs cooler on the wheel, and washes out of the work easier than any other Tripoli composition manufactured.



TRIPOLI COMPOSITIONS

"SPECIALIME." Produces a very high lustre on nickel plated brass and copper goods and is a good lime composition for general work.

"BULL DOG WHITE FINISH." Is a fast cutting composition, produces a very high color and is especially adapted for use on nickel plated stoves and other cast iron and steel parts.



EMERY COMPOSITIONS

EMERY CAKE. Made in various grade in both grain and flour sizes. This emery cake is made entirely of emery and has an efficiency far in excess of goods usually sold under this name. It is prepared with pure hard greases for use on iron, steel and brass work where quick cutting is desired.



CROCUS COMPOSITIONS

CROCUS COMPOSITIONS. Used largely on stove work and where a very high finish is desired on cast iron and steel work. We furnish these in two grades as given below.

**Grade No. 1**  
A thoroughly high grade of padded crocus bar used by discriminating users on silver, nickel, brass, tin, etc.

**Grade No. 2**  
An all around crocus composition used chiefly by the stove trade on nickel trimmings. It possesses excellent cutting and finishing qualities.



CROWN COLORING COMPOSITIONS

"CCC" is a dependable white coloring composition and is designed for coloring brass, copper, bronze and aluminum before plating. It is especially adapted for use on oxidized copper work for "spotting." It leaves the work in a clean condition and is an economical material to use.

Complete Plating and Polishing Equipments,  
Crown Rheostats, Polishing Lathes, Buffs, etc.

**CROWN RHEOSTAT & SUPPLY CO.,** 31-33 S. Desplaines St.,  
Chicago



# REDUCED PRICES

On Full Disc—Loose or Spirally Sewed

# BUFFS

ABSOLUTELY ROCK BOTTOM

No need of looking anywhere else for  
buffs. We can make immediate ship-  
ments from stock on all standard grades  
and sizes of full disc loose or spirally  
sewed buffs.

We have two factories having the  
largest buff producing capacity in the  
industry.

## DIVINE BROTHERS COMPANY

Metal Finishing Engineers

Factories at UTICA and BOONVILLE, N. Y.

Main Office—UTICA, N. Y.

## Attention, Buff Users

We make a sewed buff of cotton cloth that is especially treated for work on brass, copper, steel and iron. We make this buff of any degree of stiffness desired. Any manufacturer who has difficulty in getting a buff stiff enough for his work will be more than satisfied with our heavy black wheel.

We also make

**LOOSE BUFFS  
SEWED WHITE BUFFS  
CANVAS WHEELS**

The canvas wheel is made of a grade of canvas that we have found to be best suited for all kinds of roughing. It is durable, flexible and cheap.

**PROMPT DELIVERIES**

**THE MILTON MANUFACTURING CO., Inc.**  
116 Milton Avenue Syracuse, N. Y.

**SYRACUSE SUPPLY COMPANY**

311 W. Fayette St., Syracuse,  
N. Y.

99 W. Genesee St., Buffalo,  
N. Y.

306 Arlington Bldg., Roches-  
ter, N. Y.

SELLING AGENTS FOR CENTRAL  
AND WESTERN NEW YORK STATE.

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For Electroplating,  
Electrotyping and  
Electro - Galvanis-  
ing in single, two  
and three voltages  
60 to 10,000 Am-  
peres 3 to 30 volts.  
Shunt, compound  
and separately ex-  
cited.

Write for cata-  
logue "M"

**CHAS. J. BOGUE  
ELECTRIC CO.**

513-515 West 29th Street, NEW YORK  
Cable Address "MACHELECT" Phone, 581 Chelsea

## Electro-Plating Generators

From 175 to 8,000 ampere capacity

Maintaining

**CONSTANT VOLTAGE**

with all changes of load.

Voltage adjustable from 2 to 3 volts—  
larger sizes from 4 to 12 volts.

**Jantz & Leist Electric Company**  
Cincinnati, Ohio

COPPER CARBONATE  
ZINC CARBONATE

**NICKEL**

HYDROFLUORIC ACID  
BONE ASH

DOUBLE NICKEL SALTS  
SINGLE NICKEL SALTS

**ANODES**

BLUE VITRIOL  
CYANIDE

**JOHN C. WIARDA & COMPANY**

273 GREEN STREET

BROOKLYN, N. Y.



# BIG FOUR

## EASTERN BRAND FELT WHEELS

Independence,	Fine White
U. S. A.	Spanish White
Victory	Coarse White
X. L.	Mexican Grey

Our claim is the **LIGHTEST WEIGHT WHEELS** on the market, proving they are made from **PURE WOOL** and not mixed with **WASTE** to make heavier weight.

A RECENT COMPARISON on a 14 x 2½" REGULAR HARDNESS—our "D" grade and a wheel, same size and density manufactured by another Felt Company showed the following results:

THE OTHER WHEEL WEIGHED 10¼ Pounds  
OURS WEIGHED 8½ "

FIGURE THE DIFFERENCE on to-day's price and you will **SAVE** on this size alone from

**\$3.00 TO 5.00 PER WHEEL**  
ALL SIZES IN SAME PROPORTION

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|------------|---|------------------------------------|
| <b>A</b> — | Extra soft, for buffing. Can be used in water or oil and retain original shape until worn down. |                                    |
| <b>B</b> — | Soft, for buffing Stoves, Aluminum, etc., and can also be run in water or oil.                  |                                    |
| <b>C</b> — | Medium.   | } Both used for general polishing. |
| <b>D</b> — | Regular Hard  |                                    |
| <b>E</b> — | Extra Hard, used for extra hard work, such as Handle Bars, Bells, Plated Silver, etc.           |                                    |

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For All Buffing, Polishing and Mechanical Purposes

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DEPT. A  
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For Foundry Parting and Buffing and Polishing  
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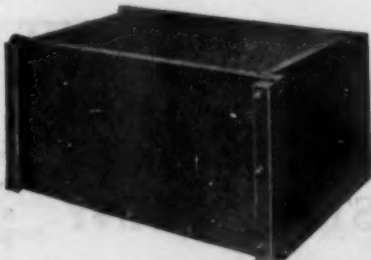


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Spanish White Felt Wheels  
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All grades of Sheet Felt  
Rock Hard—Hard or Soft

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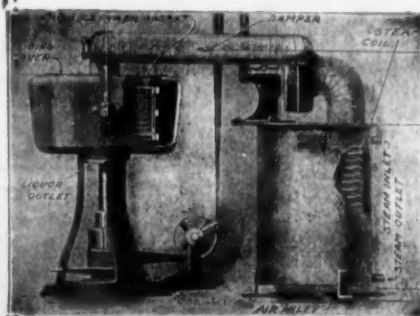
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Sizes 12" to 40"

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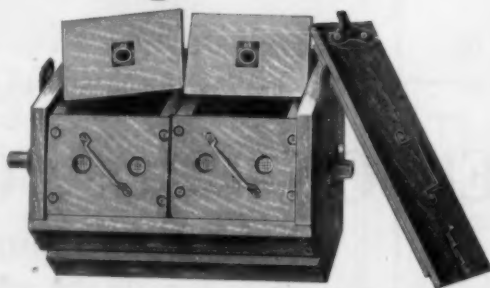
An essential  
part of the  
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and of all large  
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parts.

## Imperial Patented Multiple Compartment Machines



No. 12  
Pat. Sept. 17, 1912

We also build several sizes of single compartment machines and carry a complete stock of steel balls, cones, spickets and soap powder for burnishing purposes. We solicit articles for free demonstration.



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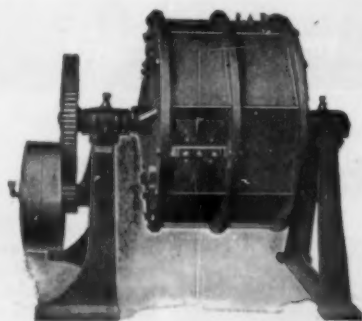


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No. 4  
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**SMITH RICHARDSON CO.**

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Better Work—Larger Production—Lower Costs  
Adapted to nearly all kinds of Small Metal Parts

Send us samples of your parts for demonstration. Catalog on request.

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Originators of the most exclusively used modern methods of Commercial Ball Burnishing.

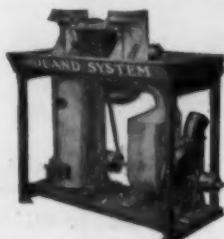
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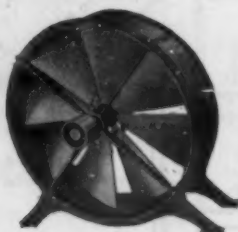
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*Also Manufacturers of Sheet Metal Stampings, Dies and Tools*

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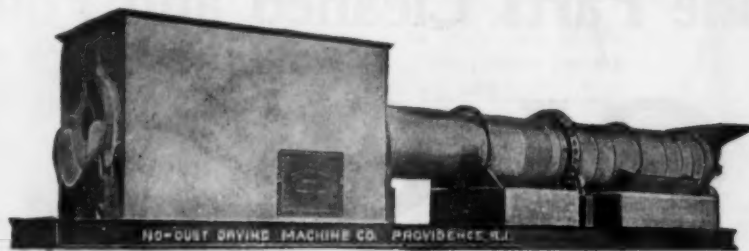
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washes thoroughly each individual piece inside and out—washes them better than they can be washed by any other method and in less time. Washes shells and cups as easily and quickly as flat pieces and each article will be uniformly cleansed.

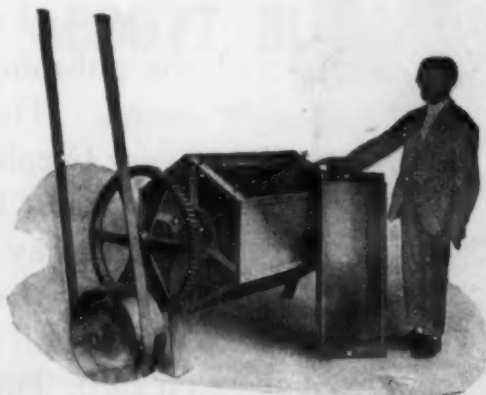
Machines may be had for one or more solutions wash, with a clean water rinse after each solution wash. Delivery is from one bushel up per minute, regardless of number of operations. One man operating this machine will do as much work as eight or more can do by dipping or hand methods. One installation with a pickling section showed saving in labor of twenty-four men. Any one of the machines will pay for itself in three or four months. Figure it up yourself, at a bushel a minute, and see how many men you could save. All solutions drain back to tank—you lose only what adheres to the surface.

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**A**T last we have designed the tumbling barrel which has long been desired by the trade for dry tumbling metal parts in sawdust, sand or any other dry tumbling substance. It is gear driven to save power, built strong, yet not bulky, of riveted steel plates and is octagonal in shape. It can be furnished with hard wood lining to withstand severe wear and tear, and it need not be taken apart for rebuilding.

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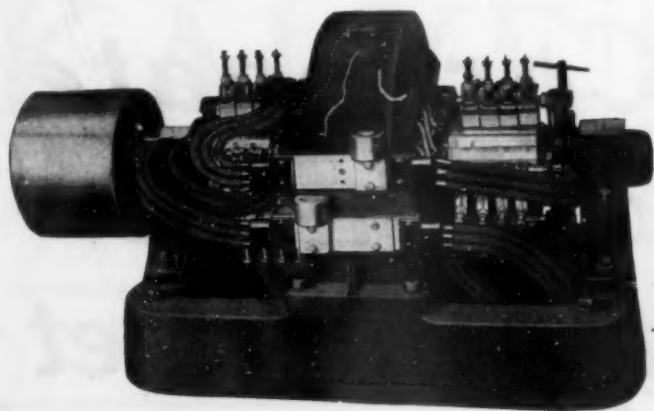
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Rinses chemically clean. Does not leave soapy or caustic film (adhering to the work) to cause a blistered or peeled plating deposit.

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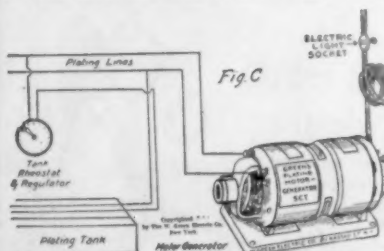
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## PLATING DYNAMOS



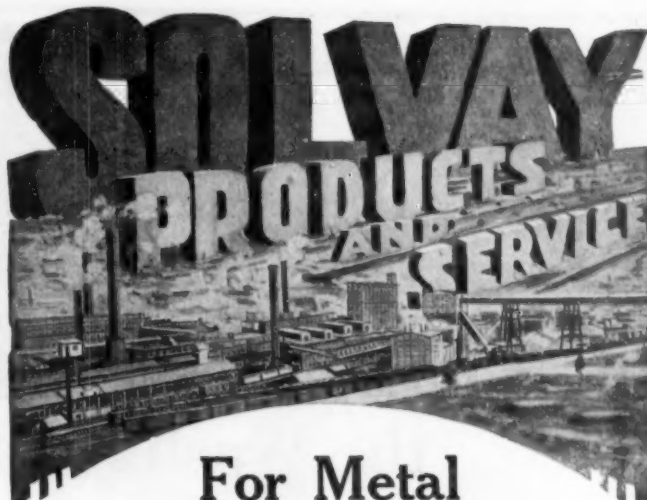
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These products are highly refined, and analyze as specified. Their use assures economy in cost and satisfaction in results.

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Booklet on "Metal Cleansing" Mailed upon request

**THE SOLVAY PROCESS CO.**

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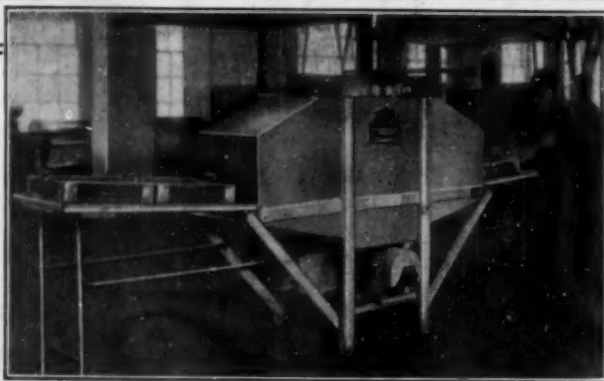
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## Revolutionizes the Washing of Metal Parts

Washing metal parts by hand is slow, sloppy, unsatisfactory work. The cost is high. Volume and quality of work are both uneven.

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Fine threads or edges can't be damaged in the Crescent. The parts don't move while being washed. The pressure of water from above and below is equalized—no rolling and hammering of parts against each other. Yet the force of the water pumped through the rotating arms insures a thorough cleansing of complicated parts, openings, channels and irregular and intricate interiors. This double wash is a feature that is exclusively Crescent.

Simple, clean and positive in operation, and sturdy in construction, the Crescent reduces production costs materially. In *thirty seconds* it does work that under old methods take thirty minutes. It is the safer, easier, more sanitary and more economical method.



*Write today for Crescent facts and figures.  
Let Crescent users give you their opinions.*

**Crescent Washing Machine Company**  
87 Beechwood Ave., New Rochelle, New York

*From the revolving arms shoot torrents of cleaning solution at high pressure which hit the surfaces at every angle. Top and bottom, inside and outside, the full force of water beats and swirls over every surface and into every crevice.*

### A Few Representative Concerns Using the Crescent

Burroughs Adding Machine  
Company

Toledo Scale Co.

Timken-Detroit Axle Co.

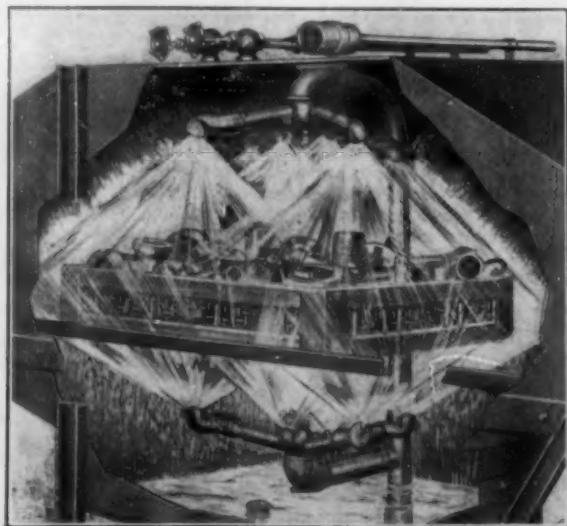
Gillette Safety Razor Co.

Willys Corporation

Stewart-Warner Speedom-  
eter Corporation

Hoover Suction Sweeper Co.

B. F. Goodrich Co.



## The Measure

The real measure of metal cleaning efficiency is not found in claims or promises, but in the hard school of every day performance.

Measured by the work it is doing in metal production plants the country over

## WYANDOTTE Metal Cleaner

because of its proved efficiency, dependability and economy, stands alone.

You wouldn't believe, until you try this cleaner the speed with which "chemically clean" metal parts can be taken from the solution, each part ready for japanning, plating or any after process, or ready for instant fitting or for stock.

Then, too, every pound of this cleaner is of absolute uniform quality and will to the last ounce perform its exceptional service at a great saving in time, labor and cleaning cost.



Order from your  
supply house

The J. B. Ford Co.

Sole Mnfrs.

Wyandotte

Mich.

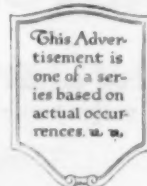


## O. P. C. Cleans 5 Times Faster

**W**ORK is put through in one-fifth former time by cleaning and plating with O. P. C. (Oakite Plater's Cleaner).

Only three operations are required instead of seven—and perfect results are secured.

Formerly (1) scrubbed plates (stereotype metal) with pumice—20 minutes to each plate—(2) cold-rinsed, (3) cyanide dip—then (4) rinsed, (5) copper plated, (6) rinsed—(7) nickle-plated.



This Advertisement is one of a series based on actual occurrences. U. S. P.

Now 3 or 4 castings at a time are placed directly in tank (1) made up of sodium cyanide, copper cyanide and Oakite Plater's Cleaner, then (2) rinsed and (3) nickel-plated.

The saving in time and labor means dollars saved in production costs.

*May We Serve You Too?*

**OAKITE**  
MANUFACTURED BY  
**OAKLEY CHEMICAL CO.**  
18 THAMES STREET • NEW YORK



*You are certain of prompt and reliable*

# **SERVICE**

*by sending us your orders for PLATERS' CHEMICALS*

*Through long experience we have developed the most efficient and economical plating salts in the market.*

## **METAL CYANIDES**

Copper	69½/70½%
Zinc	54½/55½%
Silver	79½/80½%

## **SODIUM CYANIDE 96/98%**

Zinc Sulphate  
Bluestone  
Caustic Soda  
Soda Ash

## **POLYSULPHIDE**

*for oxidizing*

## **NICKEL CHLORIDE**

**NICKEL SALTS**, *Single and Double*

*You are invited to call upon the service of our staff of experts when making up new solutions or correcting old ones.*

*Send for booklet.*

—THE—

**ROESSLER & HASSLACHER CHEMICAL CO.**

**MANUFACTURERS**

**709-717 Sixth Ave., cor West 41st St.  
New York**

*Branches: Boston, Chicago, Cincinnati, Cleveland  
Philadelphia, Kansas City, San Francisco, Akron*

# APOTHECARIES HALL CO.

WATERBURY, CONN.

SOLE MANUFACTURERS OF

## The Famous Deloye Patented Anode

IN NICKEL — COPPER — BRASS — ZINC

SPEAKS FOR ITSELF

### "TARGOL"—The Original Cream Tartar Substitute

NICKEL SALTS—SINGLE AND DOUBLE  
BUFFS AND BUFFING COMPOSITIONS

PLATING CHEMICALS — HEAVY CHEMICALS  
WYANDOTTE CLEANERS

TURPENTINE — ACETONE — ALCOHOL — LINSEED OIL

*Suppliers of the Great New England Mills for the Past 69 Years*

# HF & G

SINGLE  
DOUBLE

## NICKEL SALTS

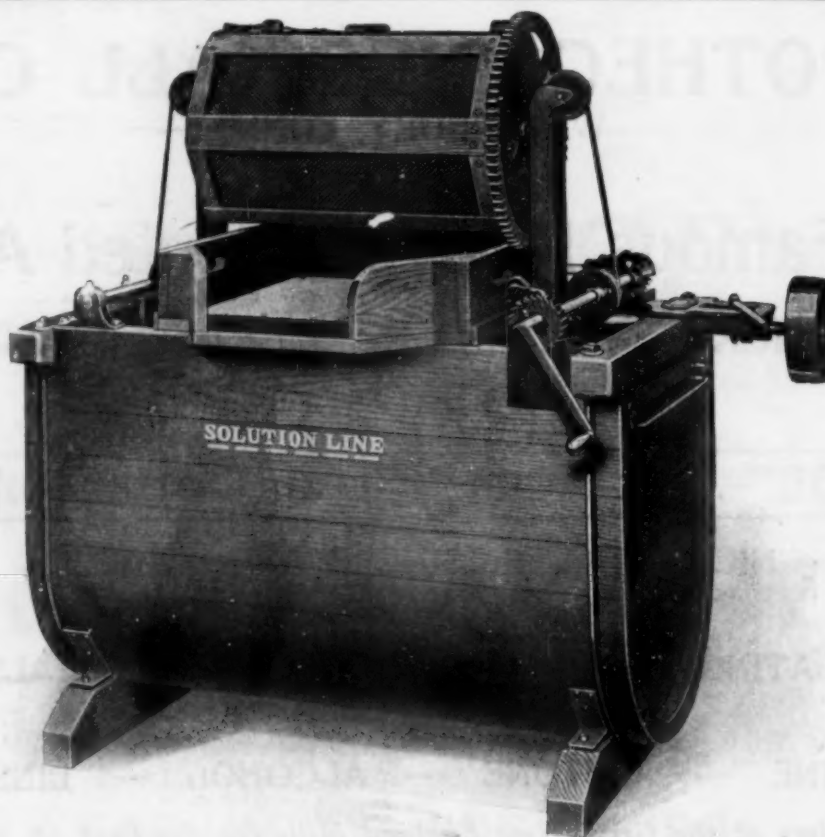
Standard Grade  
Prompt Delivery

THE  
**HARSHAW FULLER & GOODWIN CO.**

Chicago

Cleveland  
New York

Philadelphia



(Patented)

## You Can Surely Cut Your Plating Costs

The CROWN PLATING MACHINE will do the work cheaper, better and quicker.

Adapted for Electro Plating Nickel, Brass, Copper, and Electro Galvanizing.

It is the last word in mechanical plating equipment, with every improvement tending to increase production at a minimum cost of operation.

It features the only practical elevating device, making it easy to load and unload the cylinder.

The Crown Plating Machine is built of the best materials. Strong in construction—simple in operation.

If you are looking for a real Plating Machine install the CROWN. You will be agreeably surprised with results.

WRITE TODAY FOR OUR BOOKLET.

# The National Steel Products Co.

Box 865

DAYTON, OHIO



## Settled in Our New Factory and Better Equipped Than Ever

to maintain with enlarged facilities and added efficiency the famous Boissier standard of quality in all of our products.

We are now located in our new and spacious premises, from 10th to 11th Streets, between Vernon and East Avenues, Long Island City, N. Y.

Seven minutes from Grand Central Station, 42nd Street, New York City, to Jackson Ave. Station, Long Island City, via Queensboro Subway.

As is generally known, our experience covers nearly half a century in the manufacture of:

### "WORLD" DYNAMOS AND MOTOR-GENERATOR SETS;

"World" Mechanical Plating Barrels, Tanks, Rheostats, Voltmeters, Ammeters, Switchboards and other Apparatus and Equipment for the Electro-deposition of Metals.

We are sole agents for

## Swiss Copper Anodes

### Absolutely Without Waste

#### THE PUREST COPPER ANODES EVER PUT ON THE MARKET

A Radical Improvement in Copper Deposition.

Saving Money, Time and producing a better deposit than ever heretofore possible.

Swiss Copper Anodes are made by depositing the purest of copper on a lead starting sheet (Grid). The holes in the Anode allow the electrolyte to circulate freely; making the whole surface active and not only the edges, as in the old style Anodes.

In the old style Anodes the surface gradually diminished until an irregular stub which had to be scrapped was left, whereas in Swiss Anodes the full surface is always available until all the copper is consumed.

Swiss Anodes require no cleaning—remaining bright from start to finish, insuring constant, rapid and smooth deposition.

When the copper is all off, you return the grids to our refinery for full credit, at price paid per lb. for the new Anode.

Try out a tank equipped with Swiss Anodes and the many advantages will be readily seen.

Standard sizes are 8 x 12, 12 x 18, 12 x 24, 12 x 36. These sizes do not include ears, which are 3 inches long.

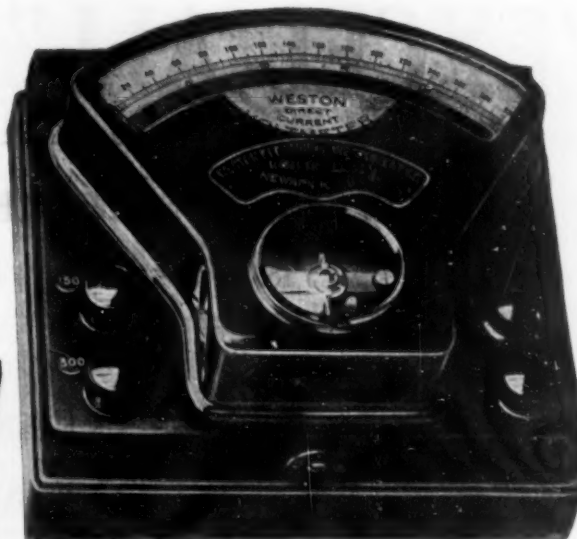
## BOISSIER ELECTRIC CO.

OFFICE AND WORKS:

81 to 89 10th Street

Long Island City, New York

Telephone "Hunter's Point 245"



# Weston

## Portable Indicating Electrical Instruments

are unexcelled for use in research work where quality is absolutely essential.

Inferior instruments lead to erroneous results, often involving large financial loss.

Weston instruments are scientifically and mechanically correct; their indications can be relied upon.

To assure against error and know the actual facts, use Weston Instruments.

There is a Weston Instrument for every purpose.

Write for bulletin, specifying the particular field that interests you.

## Weston Electrical Instrument Co.

155 Weston Ave., Newark, N. J.

Branch Offices in Leading Cities throughout the World

# "EXCEL-ALL" and "MASCOT"

## Trade Names That Mean Reliability and Economy



### Some Specialties—

#### MASCOT TALLOWEEN

Better than tallow for lubricating and filling grease polishing wheels, because of its high melting point and adhesive quality.

It is purely vegetable and animal grease and saponifies readily in all alkali cleaning solutions.

A small quantity used in connection with buffing composition, especially on work being done on automatic buffing machines, prevents scorching and burning and adds greatly to the life of the wheels—a fact worthy of consideration at this time, as buffs at present prices represent quite an item of expense.

Talloween is an agreeable article to handle; it is clean, without odor, put up in paper cartons containing about one pound.

Send for "Talloween Bulletin M-1"

#### MASCOT NICKEL STRIP

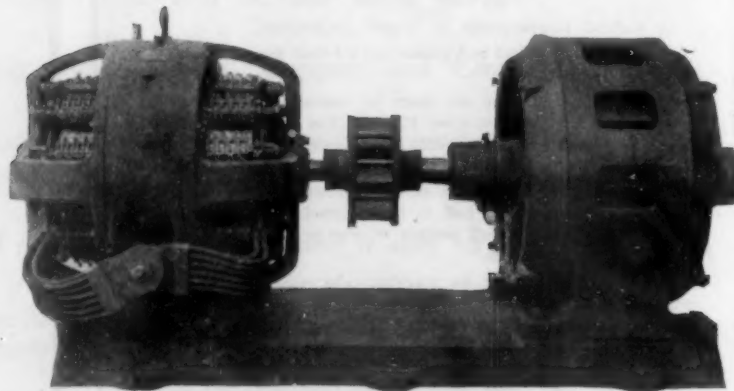
A very simple strip for brass and copper. Gives the best results. Send a trial order and try it out. And ask for "Nickel Strip Bulletin M-1."

#### MASCOT PLATING BARREL

Embodies the best ideas in mechanical plating barrels. Simple in principle, efficient and reliable in operation, economical in up-keep. Ask for Mascot Barrel Bulletin M-1.

#### EXCEL-ALL PLATING DYNAMOS

These Dynamos are a painstaking development of all that can enter into the design and building of the most efficient and economical apparatus of the kind made. They are no experiment, they are making good daily in hundreds of progressive plants and are handling loads that the ordinary dynamo would go to pieces under. They are right, they should be in your plant for your financial gain. Bulletin MI 105.



6000 AMPERE, 6 VOLT GENERATOR SET.

FREE ( FREE  
WRITE FOR OUR  
LITMUS PAPER PAD  
FREE FREE

MANUFACTURED BY

**Bennett-O'Connell Company**

3600 South Morgan Street  
Chicago, Ill.

## You Buy Anodes By the Pound— You Use Them By the Square Inch

*Why not get the most square inches for your pounds?*

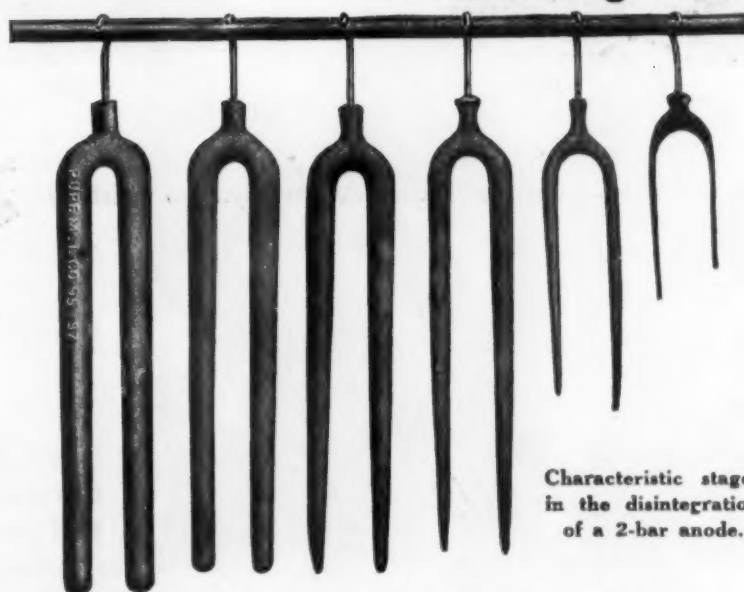
A bar of nickel one inch square and 10 inches long has 42 square inches of surface. Cut it in two lengthwise and each half-bar will have 31 square inches of surface—62 square inches in all.



Thus an increase of nearly 50 per cent in surface is gained by merely dividing the bar—50 per cent more metal for the solution to act on than is presented by the same amount of metal in the shape of a single bar.

This is just the principle of the 2-bar anode—it gives you more square inches of surface per pound.

### 2-Bar Anodes Will Reduce Your Plating Costs



Characteristic stages  
in the disintegration  
of a 2-bar anode.

Note the uniform wearing qualities of the 2-Bar Anode—the astonishing elimination of waste. The nickel Anode on the left weighed 14 lbs. originally. The remains of the same Anode in the last stage of disintegration, shown on the right, weighed only 8½ ounces. Waste, 3.8%.

We have never used a pound of scrap nickel in our anodes of either grade. Write for our Bulletin No. 600 on Anodes and Plating Salts—you will find it of practical value.

## A. P. MUNNING & CO.

Manufacturers of Electro-Plating and Buffing Apparatus and Supplies  
Factories at MATAWAN, NEW JERSEY, and CHICAGO, ILLINOIS

Offices in New York: Hudson Terminal, 50 Church St.

Chicago: 2920 Carroll Ave.  
Detroit: 604 Free Press Building  
Philadelphia: Bourse Building  
Boston: Cutter & Wood Supply Co.  
Providence, R. I.: Geo. L. Claffin Co.  
Minneapolis, Minn.: J. F. Quest & Bro.



Cleveland: 709 Marion Building.  
Springfield, Mass.: 43 Fort Pleasant Ave.  
Rochester, N. Y.: 415 Ridgway Ave.  
St. Louis and Kansas City: Thompson-Munro-Robins.

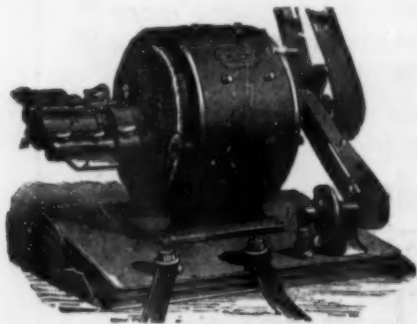
Pacific Coast Agents: F. O. Stallman Supply Co., Los Angeles and San Francisco, Cal.



# 1820—A CENTURY

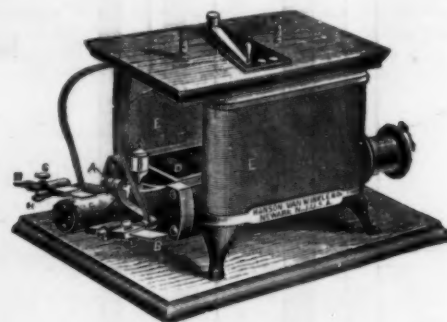
## MANUFACTURERS of PLATING and

Did you know that all the early experiments and improvements in dynamos were made with a view of perfecting an electrical machine for plating, and that this success was the forerunner of all the dynamos for other purposes in such general use today?

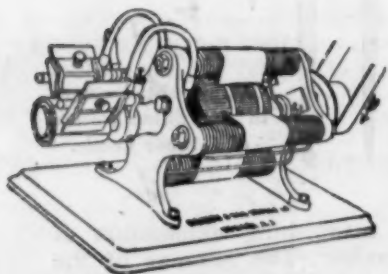


In 1876 we began manufacturing the "Weston" dynamo for electro-plating. This was the first commercial electro-plating generator in the market. It met with pronounced success, and to it can be traced much of the development of electro-plating and electrotyping.

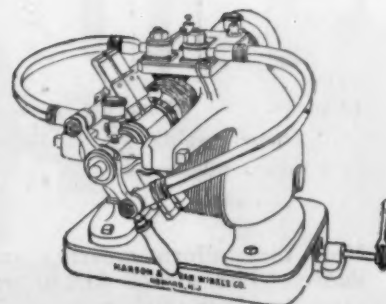
Sales were made not only in the United States but in England, France and Russia.



In 1885 we brought out the "Little Wonder" dynamo which became very popular.



In 1886 we introduced the "Wonder" dynamo. It embodied many improvements over the preceding machines, and it was then thought that perfection had been reached.



In 1891 after developing many entirely new features we produced our Type "C" generator in order that the trade might reap the benefit of our experiments. This type of machine had a remarkable sale. A number are in use at the present day.

Chicago Office and Warehouse:  
836-846 West Erie St.

**THE HANSON &**  
**Main Office and Factory**  
Canadian Hanson & Van Winkle Co.,

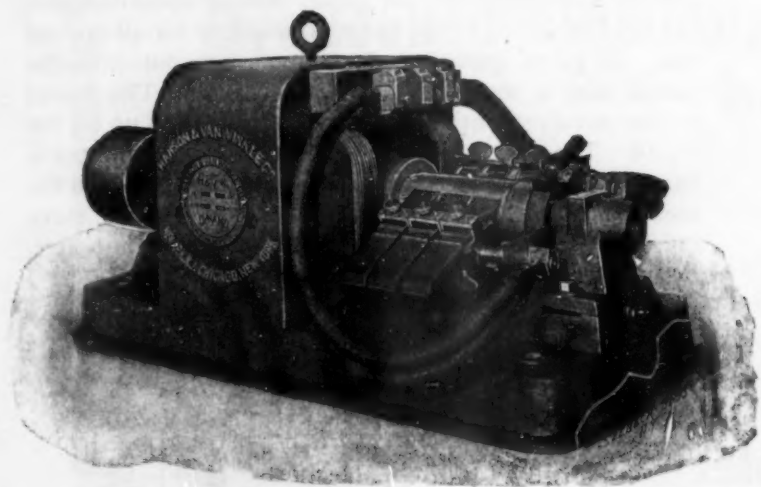
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# OF BUSINESS—1920

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## POLISHING SUPPLIES and EQUIPMENT

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In 1894 in consequence of our constant aim to supply electro-plating dynamos of the highest excellence we introduced our "Type N" compound wound Bi-polar machine. The compound winding was a stride forward in plating dynamo construction. We believe we are the first to commercially offer a dynamo of this character.

The year 1903 saw the introduction of our "Multipolar" dynamo. This was recognized as a great improvement over former types.

Since 1912 we have been offering our "Interpole" type plating generator, which embodies special features and immediately appeals to operators who have become familiar with its merits.

Our persistent effort toward perfection has not been restricted to dynamo construction alone, but embraces our entire line. Mechanical plating apparatus of various types have been developed and improved, together with many other of our products. These include the materials and equipment used for plating, polishing and finishing of metals.



MAY OUR EXPERTS ASSIST YOU WITH YOUR PROBLEMS?

---

### VAN WINKLE CO.

Newark, New Jersey

Ltd., West Toronto, Ontario, Canada

New York City Office and Warehouse:  
70 Lafayette St., Corner Franklin St.

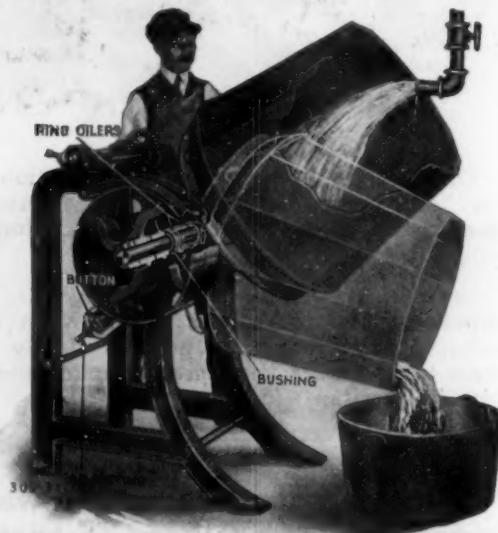


## "Baird" Japanning Barrel

The equipment that will be found in hundreds of plants doing a japanning business. Thoroughly tried out by practical use and found best for the purpose. Essentially an oblique tumbling barrel frame with special sheet metal barrel having the open top of much larger diameter than the bottom. This special shape barrel greatly aids inspection of goods during operation and has been found to be the most satisfactory for all around use. A given quantity of products are put into the barrel with a measured amount of japan. The barrel is then revolved until the products have taken up all the liquid. The process is termed coating and produces a hard even surface, the japan seems to adhere closer to the metal and the after process of baking is done more quickly, there are few blisters and the result is better. Baird Bulletin No. 300 gives details.

## "Baird" Oblique Tilting Tumbler

This tumbler is probably used in a greater number of industries and for more varied purposes than any other similar machine manufactured. Without having any excess refinements of detail the complete machine has every improvement that has been found desirable in every day practical use under regular shop conditions. Any barrel combination can be supplied—as wood, sheet iron, cast brass, cast iron, etc. Can be tilted to any position while in operation and locks at any angle so as to increase or modify the tumbling action. Can be either filled or dumped like pouring water into or out of a bucket. Baird Bulletin No. 300 gives details.



The BAIRD COMPANY is the largest manufacturer of tumbling barrels in the country; keep a full stock of standard machines for prompt shipment and are in position to make up special tumbling outfits at short notice. The Bulletin 300 gives details as regards Oblique Tilting Tumblers, Japanning Barrels, etc. Number 301, Steam Drying Out Barrels. Number 302, Horizontal Tumbling Barrels, both exhaust and non-exhaust. Number 303, Steel Ball Burnishing Machines. Number 399, Fanning Machines or Separators. Send for these bulletins.

## THE BAIRD MACHINE COMPANY

Bridgeport

Connecticut



### FOREIGN REPRESENTATIVES

R. CRICKSHANK, LTD.	BIRMINGHAM, ENGLAND
Société Anonyme des Etablissements FENWICK FRERES & CO.	PARIS, FRANCE
FENWICK FRERES, 1 Avenue Blonden	LIEGE, BELGIUM
FRATELLI FENWICK, 6 Via Lagrange	TORINO, ITALY
VICTOR SOUSSAN, 29 Rue de Goncalves Dias	RIO DE JANEIRO, BRAZIL
S.V. CONSTANTINOV "Industry Corp."	MOSCOW AND KRASNODARSK, RUSSIA
ZAYAS-ABREU COMMERCIAL CO.	HAVANA, CUBA





HILo

*Japans, Enamels, Varnishes*

## Overlooked Finishing-trouble holds-up Output.

A manufacturer of automobile metal parts found his finishing room in serious trouble. The difficulty, at one time small, was neglected too long and finally burst out with a costly hold-up in the production line.

Hilo "Better-the-Finish" Service was called in for co-operation and a Hilo Service Salesman was dispatched to the scene. He found the source of trouble was in faulty ventilation in the ovens.

The Hilo Service Salesman recommended more air and better

fans in the ovens. This was followed and the manufacturer is now able to do his finishing on schedule and the products carry a better finish.

That the Hilo "Better-the-Finish" Service is ready to co-operate at all times has been a satisfaction to many manufacturers. An efficient corps of men, trained by experience in finishing processes, offer you the benefit of their knowledge in helping remove your finishing difficulties.

No obligations,—merely a letter  
brings you Hilo Finish co-operation



7 Gerry St.,  
Brooklyn, N. Y.

# Hilo Varnish Corporation

Formerly Moller & Schumann Co. Est. 1863

2420-24 Washburne Ave.,  
Chicago, Ill.

*Japans, Enamels, Varnishes*

HILo

"All Stevens Specialties Are Especially Good"

# Save Profits

There are two ways to save profits:

One is to buy inferior supplies at a low price and consume twice as much time and labor as if better were bought!

The other is to buy Stevens' Specialties.

Here are some REAL profit savers:

## Foundry Specialties

### Stevens' King Kore Kompound

A black dry powder, but containing two adhesives, one to bind the green cores, so that when cores are not baked promptly the strength of the green core permits handling without injury; another that develops its strength under heat of core oven. The ideal combination. It is used successfully when making large heavy Gray Iron cores—sometimes called "chunky" or "blocky"—also for engine beds, machine tools, railway equipment, and cores for steel castings of all descriptions. One Detroit Foundry—a large one—reported a saving of sixteen dollars per day after ceasing old methods and when using King Kore Kompound with Glutrin—not a necessary but a good combination.

### Stevens' Core Gum

Another dry binder, but not of black color. A real artist might call it "mouse-tint," but we will call it "gray" in color, but a shiner in effect. It is used for small, intricate cores, where Linseed Oil was once thought necessary and with great success. Its greater victories are with the small, delicate cores, when nothing but pure linseed has been considered before; none of these Compounds are noisy with odor. They are well behaved from start to finish.

### Stevens' Core Paste

The only substitute for high-grade flour; not the flour that has masqueraded when mixed with plaster, silica, etc., as flour, but the real hot biscuit raw material. Of course it contains no flour, but you wouldn't know that, so well does it take its place. Here is still a stock of Dextrine, Rosin, and Molasses (New Orleans black strap). The wand of the fairy is liable to touch their prices any day—get in early.

### Liquid Core Binders

Stevens' Core Oils wherever used are a synonym for Core qualities; strength, sharp edges, durability, quick baking and quick removal from casting.

### Stevens' Gargara Emery

The superiority of this emery lies in its practical results. It acts as an abrasive, it exercises its cutting qualities, then crushes and polishes. Two services are thus rendered with but one material. Stevens' Gargara Emery gives the results desired. All numbers. In kegs of 350 lbs.

## Buffing Compositions

Some of the things required by stove makers, brass plants and others:

### Stevens' White Rose Buffing Composition

For "coloring up" cutlery of all kinds and all light steel castings, WHITE ROSE is beyond comparison.

Also for buffing brass or nickel the results obtained are a delight to the eye.

The beauty of nickel or brass is brought out to the greatest advantage. Wherever a brilliant finish is required, it is unexcelled, especially where deep backgrounds are liable to be filled. Particles left in the work are easily washed out.

Put up in airtight, hermetically sealed cans. Samples free.

### Stevens' "ZZZ" Coloring Composition

For coloring copper and brass castings, or plated work, such as valves, fittings—spun brass or cast brass—use my "ZZZ" Coloring Composition.

Contains no unsaponifiable material, does not smear the work, gives a lustrous finish, cleans quickly.

It gives to brass the glory of gold.

Equally as good as copper.

Sample for trial, free.

### Stevens' Union Maid White Polish

A superior lime composition for coloring all kinds of nickel-plated work.

Imparts that beautiful blue-white finish—the looking glass lustre.

Work is economically cleaned—for "UNION MAID" is fine is grain and will easily wash out of deep backgrounds. Sample on request.

## Buffing Wheels

### Stevens' Spanish Felt Wheels

From the highest grade selected wool, light in weight and superfine in quality. Let me quote prices.

### Stevens' Felt-Sub Wheels

Cost half the price of Spanish Felts and wear several times as long. Save glue and emery. Used by stove, automobile and brass manufacturers. One brass manufacturer says the men prefer them to the felt wheel. He has purchased 78 of them in a few months. One automobile manufacturer has bought 500 from me since January first.

Samples of any wheels on order. Give size and number desired.

**INDIANA BRANCH**  
Hoosier Supply Co., Indianapolis, Ind.

**NEW ENGLAND BRANCH**  
Frederic B. Stevens, 51 Chestnut Street, New Haven, Conn.  
Edward H. Sutton, Mgr.

**FREDERIC B. STEVENS**  
Manufacturer of Foundry and Electro-Plating Supplies and Equipment  
Corner of Third and Larned Streets  
**DETROIT, MICH.**

**ERIE BRANCH**  
Frederic B. Stevens,  
251 West 19th Street, Erie, Pa.  
Charles J. Menzemer, Mgr.

**EXPORT WAREHOUSE**  
Frederic B. Stevens,  
Windsor, Ont.

There's a  
**GUARANTEED "NIKOLAS PRODUCT"**

for every Lacquer Room need

*We recommend :*

**BEDSTEAD LACQUER**

For Brass Beds, Costumers, etc.

**C. E. 5 LACQUER**

For Lighting Fixtures, etc.

**No. 1 DIP LACQUER**

For Fine Builders and Cabinet Hardware, etc.

**A-1 DIP LACQUER**

For Silver Holloware, etc.

**S. Z. LACQUER**

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**D. G. LACQUER**

For Aluminum Goods, etc.

**A-5 LACQUER**

For Silver and Gold Art and Toilet Goods.

**WATER DIP LACQUER**

For Bird Cages, Cheap Hardware, etc.

**No. 2 DEAD BLACK LACQUER**

A Fine Imitation Bower Barff Finish for Optical and Scientific Instruments, etc.

**No. 5 DEAD BLACK LACQUER**

For Switchboards and Electrical Goods.

**RUBBER BLACK LACQUER**

For Tools and Wood Handles, etc.

**WHITE ENAMELS**

For Bath Room and Lighting Fixtures.

**COLORED ENAMELS**

For Pencils, Dolls, Artificial Limbs and Polychrome Finishes, etc.

**BRONZING LIQUID "B"**

A Wonderful Bronze Powder Medium.

**BRONZE POWDERS**

All Kinds.

**SPRAYING APPARATUS COMPLETE**

**G. J. NIKOLAS & COMPANY**

77 Broadway, Brooklyn, N. Y.

1227-35 Van Buren St., Chicago, Ill.





## Lacquers, Enamels and Bronzing Liquids of high Lustre and great durability

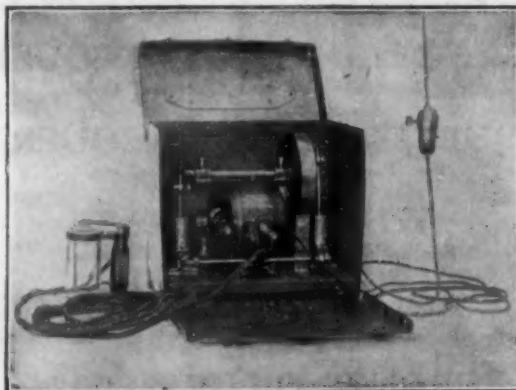
Economical, because they are unexcelled in degree of concentration.

For all purposes and all operations.

UNITED STATES LACQUER CO., Inc., 444 Driggs Ave., Brooklyn, N.Y.

## UNIVERSAL PORTABLE AIR PAINTING OUTFIT

Power Derived  
from nearest  
Lamp Socket



Shipped in  
Convenient  
Carrying Case

ORIGINAL PORTABLE SPRAYER  
Weight 28 Pounds

SAVE TIME AND INCREASE PRODUCTION BY INSTALLING  
OUR APPLIANCES IN YOUR SHOP

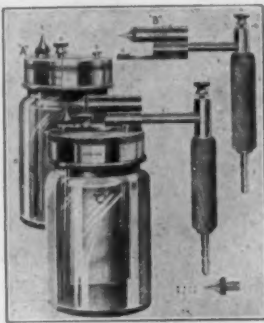
MANUFACTURERS OF  
Air Painting Devices

Sprayers

Demonstrating  
Room  
138 Baxter St.,  
New York City

**UNIVERSAL SPRAYER COMPANY**  
174 CHAMBERS STREET  
New York City

Write for Booklet  
Telephone  
Barclay 487



## The Crown Air Brush

EXCELS in  
Simplicity of operation  
Stability of manufacture

This  
with its interchangeable feature makes it worthy of your investigation.

WRITE FOR DESCRIPTIVE  
MATTER

MANUFACTURED BY  
**B. E. HOLTON CO.**  
1007 S. Figueroa St.  
LOS ANGELES CAL.

Pat. Jan. 4, 1916.

Whenever the man in charge of our Sulphurette Department opens up a batch, he invariably says:  
"This Sulphurette looks good enough to eat."  
We don't want you to eat it, but we do want you to use



## SULPHURETTE

in your electro-plating department.

A better oxidized copper finish at a lower cost.  
"Let's go."

**C. G. BUCHANAN CHEMICAL CO.**

MAKERS OF INDUSTRIAL CHEMICALS

Sta. H.,

Cincinnati, Ohio, U. S. A.

## Stop! Listen to Reason!

The November issue of this Publication contained several good articles on plating and finishing, which help you to sell your products and lead to repeat orders. Your material manufacturer spends his space in this issue to convince you that your success depends largely upon this vital point.

Don't blame the material or your head finisher when trouble is directly traceable to the sprayer.

You can not expect finishes to be adherent, flexible and durable if these properties have been extracted by the high pressure sprayer. The fumes resulting from high pressure are the evaporation of these essentials.

An Eclipse Low Pressure (5 to 25 lb.) Air Brush will apply your finishing materials in the condition intended when compounded, leaving the greater portion of the thinner in the coating to perform its functions normally when promoting the bond, elasticity and durability of the coating.

A high pressure sprayer only proves that the pneumatic method is a possibility. An Eclipse Air Brush will convince you that it is practical, efficient and economical for your work.

**ECLIPSE—A BUY WORD FOR AIR BRUSH**  
**ECLIPSE AIR BRUSH COMPANY**  
77 Orange Street Newark, N. J.

# BRONZE COATING - NP

Pronounced by critical users the most economical and efficient medium for applying bronze powders to any metal.

Does not require a primer or top coat.

Does not "sour" the bronze powder.

Produces excellent brushed brass effect.

A sample and full information will be gladly sent you.

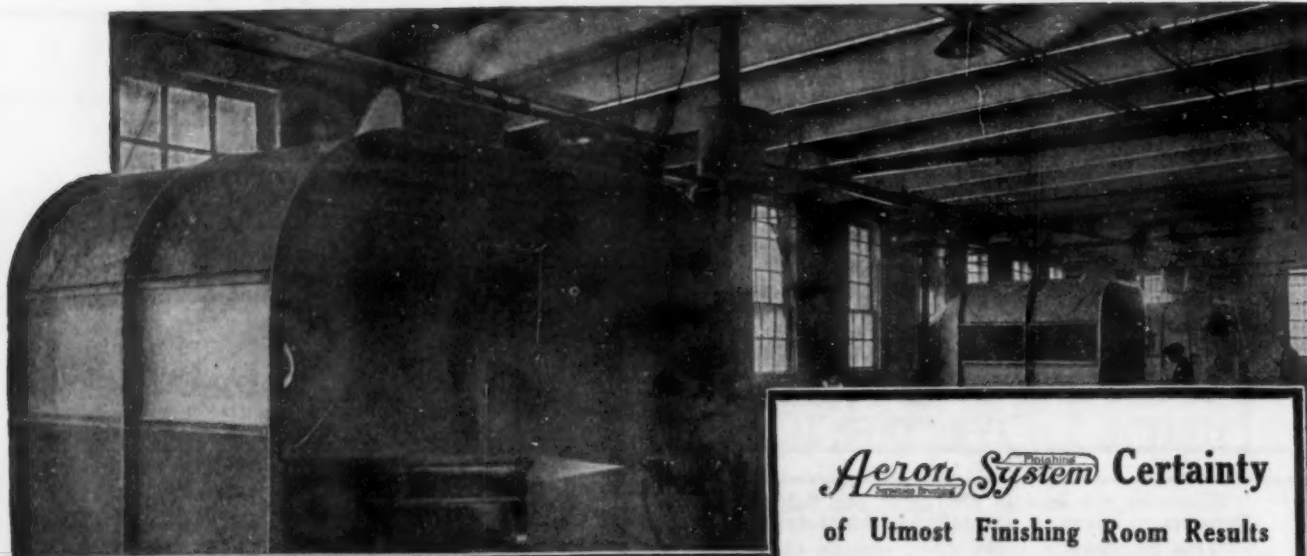
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**Tenacious-DURABLE-Flexible**  
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**Waukegan Chemical Co.**

"Values That Endure"

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**Illinois**



### *Aeron* <sup>Finishing</sup> *System* **Certainty**

#### of Utmost Finishing Room Results

The years of result-getting, satisfactory service that the Aeron spray-finishing system has been rendering the metal- and wood-working industries, gives to each new installation of this equipment an assurance of the utmost in quality, speed and economy.

No matter what type, size or grade of product you manufacture, nor with what kind of finishing material you coat it—the Aeron System undoubtedly is now being used on work of the same or a similar character, and will be most certain to make it possible for you to do the highest grade of work at a big reduction in costs.

**Operation Facts**—One Aeron operator easily does the work of 2 to 5 or more hand brushers—this is governed by nature of work.

A cleaner and more uniform coating of every material is applied—there are no bush marks, thin spots or fatty edges.

Work is made absolutely healthful and safe—all fumes are completely removed. Equipment is kept in the best working condition at practically no cost.

The Aeron System is sold on a strictly guaranteed basis, and every installation followed up by a competent service organization.

*Write and let us send on more definite particulars.*

**The DeVilbiss Mfg. Co. 3738 Detroit Ave. Toledo, Ohio**

Painting your buildings with the Aeron System PORTABLE PAINTING EQUIPMENT means a big saving in time, labor and confusion

## DO NOT EXPERIMENT!

Experiments require time and money. Let us put our years of experience at your disposal, thereby eliminating the experimental stages

in your business. One of our representatives will gladly call upon request and help you solve your finishing problems.

### The Egyptian Lacquer Mfg. Company

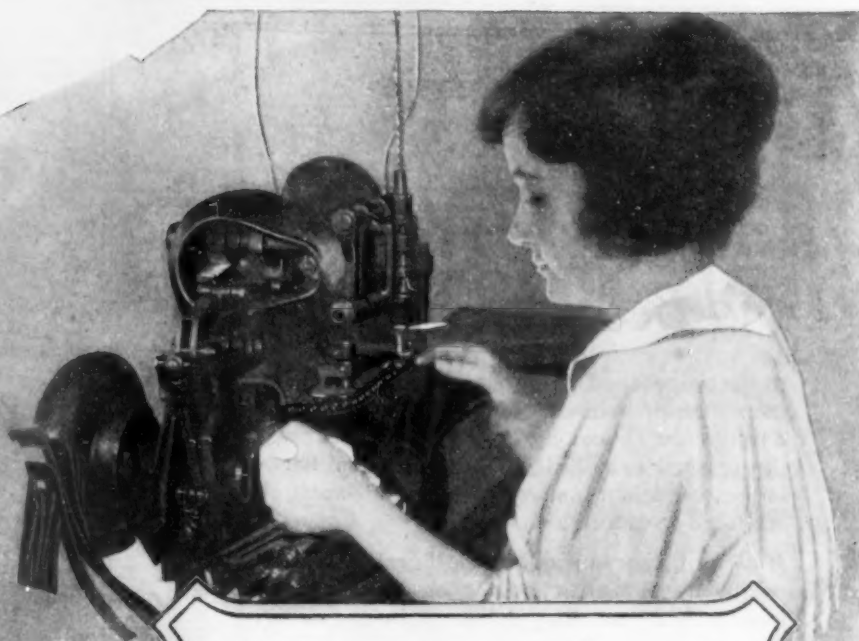
(Incorporated)

5 EAST 40th STREET

NEW YORK



Send for a copy of "The Master Finishes"—illustrated with 16 full-color pages. Interesting and helpful; every lacquer user will profit by reading it.



The shoe eyelet - snap fastener or metal button - provides a test that proves ZAPON does not crack or peel

Hardness, elasticity, adhesion — the prime requisites of a perfect finish are met by Zapon—the finish that stands the rough and tumble treatment given to many metal products.

The snapping, crimping, cutting and pounding, all go merrily on, yet the finish of the Zaponned piece holds firm.

Whatever your product — whether of metal, wood or composition, there is a Zapon finish for it—transparent lacquers and enamels in all tints and colors.

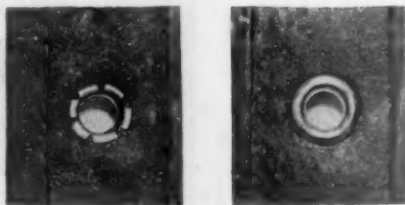
The men comprising our Service Division can bring you years of actual experience. It's a pleasure to work with you.

*Put your finishing problems up to us*

**CELLULOID ZAPON COMPANY**

200 Fifth Avenue New York City  
Chicago Los Angeles New Haven

*Makers of Lacquers, Lacquer Enamels, Solvents and  
Bronzing Liquids*



The above is an enlarged photograph showing both sides of a shoe eyelet after being attached, just as it comes from the eyeletting machine. Note how the eyelet has been bent, crimped and cut without affecting the Zapon Lacquer finish in any way.

**ZAPON**

**Lacquer's and  
Enamels**

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## *Lacquers -*

### *Lend Beauty and Protection*

to every polished metal article made for the ornamentation of house or office. The transparent yet durable film formed by Du Pont Lacquers preserves the original beautiful finish of builders' hardware, lamps, candelabra, silverware and all such objects of utility or decoration.

It is our policy to produce the finest Lacquers that can be made. Du Pont Lacquers cost no more than most others—but they deliver more per dollar.

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Silver  
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Guaranteed Superior to All  
No Matter What You Pay

## THE ORIGINAL SPRAYER

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Write for Catalog and Details  
20 Years' Experience at Your  
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SPRAYER No. 5 **Price \$9.00**



**SIMPLE  
DURABLE** **PRACTICAL  
ECONOMICAL**

Applies paint, varnish, lacquer,  
enamel, bronzes, etc., at low pressure.  
This Practical Air Sprayer has an  
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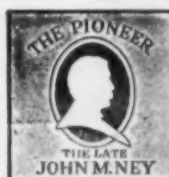
## The People of the South Seas

Revel in barbaric display. Ornamentation, not utility, is their object.

Civilization places utility first; it is the basis of much of our art because it gives it purpose. Utility demands integrity of manufacture—the thing that is useful must endure.



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**The J. M. NEY COMPANY**  
FOUNDED IN 1812  
*President*  
HARTFORD CONNECTICUT, U.S.A.



Information  
regarding  
grades and  
prices  
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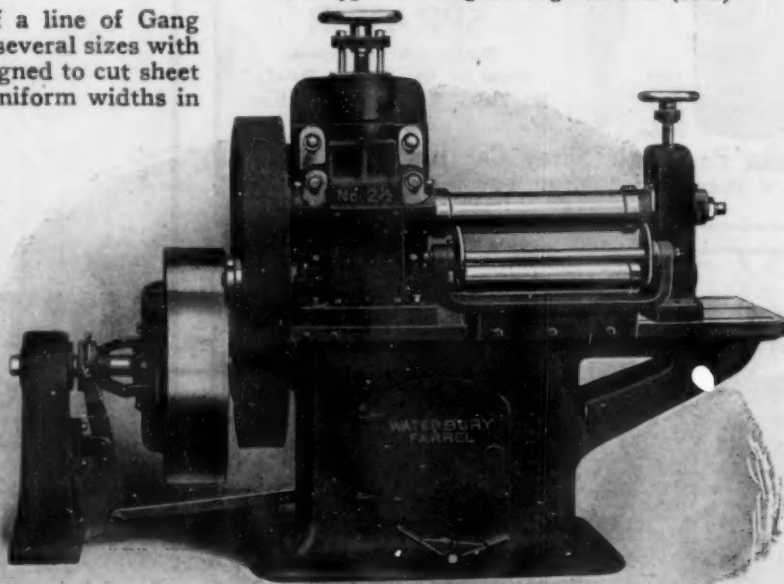
## Standard Gang Slitting Machines for Slitting Sheet Metal

The machine illustrated is one of a line of Gang Slitting Machines that we build in several sizes with belt or motor drive. They are designed to cut sheet metal into a number of strips of uniform widths in one operation, or if desired, trim off both outer edges of a wide sheet up to the limiting capacity of the spindles.

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FARREL FOUNDRY &  
MACHINE CO.**  
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No. 2½—18" Gang Slitting Machine (5643)



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**Manufacturers of**

**Electrical Conductors for Industrial, Rail-  
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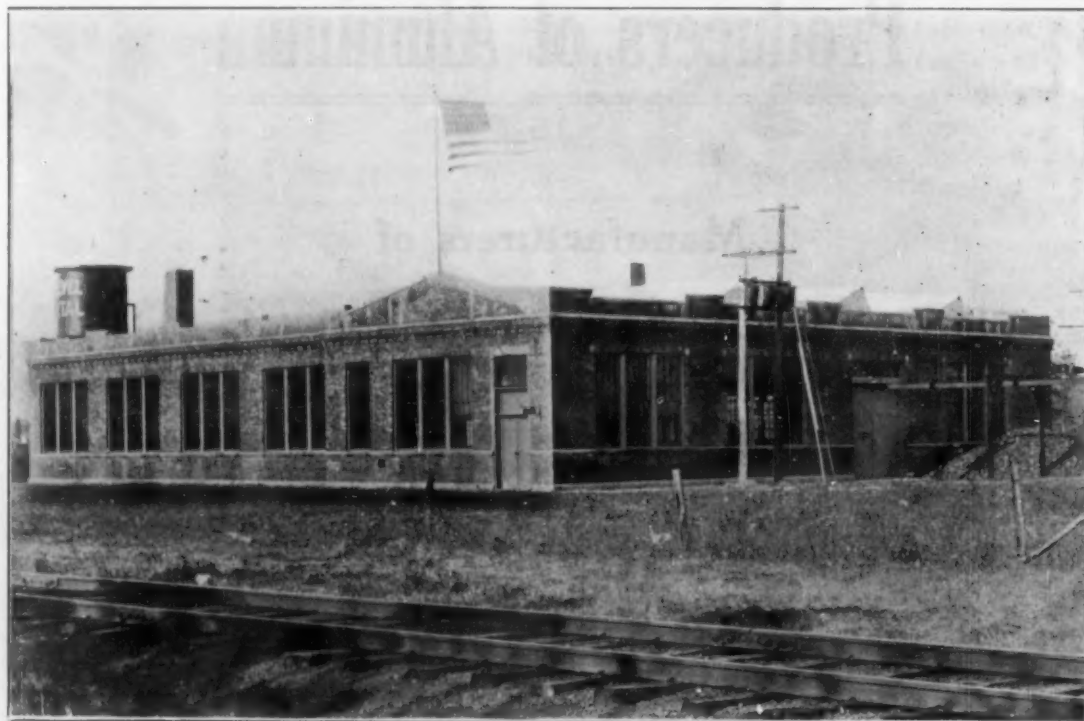
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## WHITE METALS

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# ALWITE



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### Horse Head and Bertha Brands

produced from the unique zinc ores of our Franklin, New Jersey, mine, average more than 99.94 per cent pure. They are entirely free from cadmium and other deleterious impurities, and are most advantageous for use in making the best brass, in slush castings, in special galvanizing, and in other particular work.

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THE NEW JERSEY ZINC CO., 160 Front Street, New York

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PITTSBURGH: The New Jersey Zinc Co. (of Pa.), 1439 Oliver Building

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## PURE MANGANESE 94-98% and MANGANESE ALLOYS

(Including 30% Manganese Copper, Manganese Titanium, Manganese Aluminum, and Manganese Boron)

of various compositions, carbon free and technically free from iron and other impurities, in convenient size, used in the production of:

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## Royal Products

are Guaranteed to give uniform results, thereby enabling the Foundryman to produce an alloy for castings which will be true in Purity, Hardness, Density, Toughness, etc., at all times.

The Foundryman also has absolute control of the ingredients of the mixture.

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The mode of application of Phosphorous has been perfected.

They are made of Virgin Metals.

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Two Grades—10% and 15%—of Phosphorous

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Contains 25 to 30% Manganese.

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Casting Alloy

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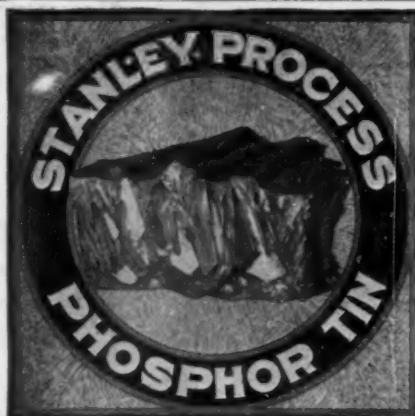
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50 Church Street



When your mixture carries a liberal tin content, Stanley Process Phosphor Tin will improve it, with practically no additional cost. This is because the tin in the Phosphor Tin is figured in as an integral part of your formula. If you've never used Stanley Process Phosphor Tin send in a trial order today. Or if you prefer, write for a sample.



#### DIRECTIONS FOR USE

When your mixture is melted, pull your crucible and add  $\frac{1}{2}$  lb. of Stanley Process Phosphor Tin to each 100 pounds of your mixture. Stir the Phosphor Tin from the bottom upward. When using either old scrap or brass turnings, add from 1% to 3% of Stanley Process Phosphor Tin.

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## Michigan Smelting & Refining Company

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Capacity 400 tons daily.

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## BLOWHOLES IN CASTINGS



are like boys who see the game through a knothole in the fence—they don't pay.

You can avoid blowholes by using **DAMASCUS SILICON COPPER**

and at the same time increase the strength, durability and appearance of your castings.

It is an alloy of Copper and Silicon made with 10%, 20% and 30% Silicon content.

WHEN THINKING OF ALLOYS  
THINK OF DAMASCUS

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## BRAND

phosphorized Bronze "can't be beat" for locomotive castings—automobile bearings—and other high grade bearings, where high speed and long life are required. It is particularly produced for particular manufacturers who demand "highest efficiency." Let us quote you prices. Produced and controlled by

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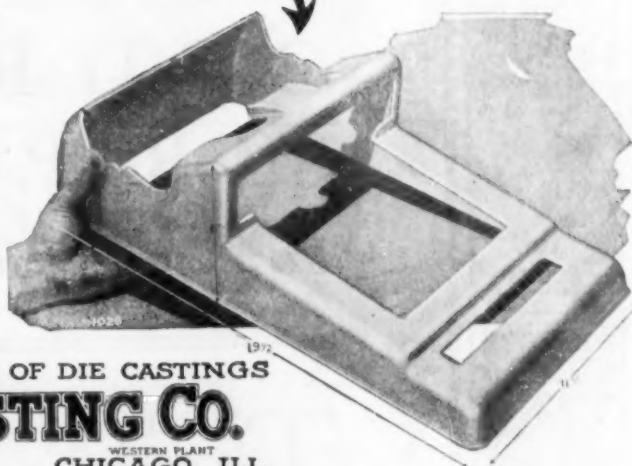
Care as to accuracy of design, finish of product, its alloy, plus the careful treatment accorded every buyer of the output of its three large plants, at

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Doehler has also solved successfully the most intricate problems put up to the Die-Caster as well as the simple problems.

**Doehler is Die-Casting Headquarters for America's most discriminating manufacturers.**

*Perhaps you have a problem which we can help to solve*



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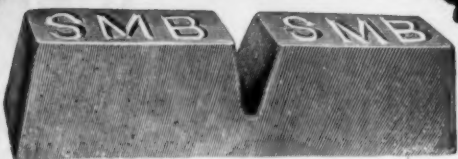
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We make three grades  
**S. M. B. Brand, Testing—**

75,000 lbs. per sq. inch Tensile Strength  
38,000 " " " Elastic Limit  
25% Elongation in 2 inches

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55,000 lbs. per sq. inch Tensile Strength  
15% Elongation in 2 inches

**American Manganese Bronze Co.**

Holmesburg—Phila.—Penna.

## Figuring Foundry Costs

Every defective casting adds to the net cost of the good castings. Too many defectives put casting costs so high that profits or customers disappear.

Ajax Process Ingots keep casting costs low because they make the "defectives" few and far between.

"IT'S ALL IN THE AJAX PROCESS"

### AJAX PROCESS INGOTS

Ajax Plastic Bronze	Ajax Phosphor Bronze
Ajax Manganese Bronze	Ajax Steam Metal
Ajax Anti-Acid Bronze	Ajax Red Brass
Ajax Hydraulic Bronze	Ajax Yellow Brass
Ajax Phosphor Copper	Ajax Manganese Copper
	Ajax Silicon Copper

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Established 1880

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*For Immediate Delivery*

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*This steel can be shipped the  
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Our sheet material possesses a very close grain, and is especially adapted for deep drawing, spinning, etc.

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Manufacturers of

## High-Grade Sheet Metals

in BRASS, BRONZE, GILDING and NICKEL SILVER

Also Special Nickel Alloys for the Jewelry Trade

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## C.C. Equals O.K.

THE customer's O. K. on the job follows so universally when C. C. Casting Copper is used that we often feel like changing the name to O. K. Copper.

C. C. Casting Copper  
is one of the famous

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TRADE MARK REG. U. S. PAT. OFF.  
**METALS**

Send in your next order for C. C. Casting Copper, it will prove out every statement we make for it.



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SHEETS, ROLLS, PLATES, WIRE and RODS—SEAMLESS and BRAZED TUBES  
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"THE ARISTOCRAT OF COMMERCIAL METALS"

A pure, solid metal which, when polished, cannot be distinguished from sterling.  
Particularly adapted for the manufacture of metal novelties, on account of its non-tarnishable features.

Let us send samples for trial purposes.

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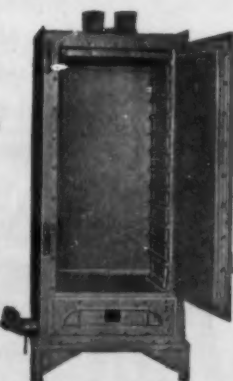
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DIRECT OR INDIRECT HEATING  
Superior Construction, Economical Operation  
For Japanning, Lacquering, Drying and  
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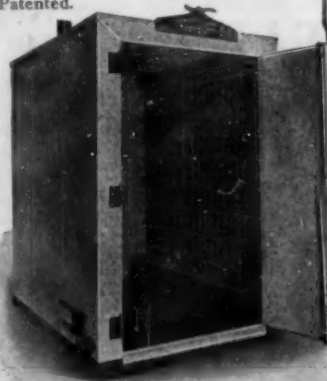


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### THE GEHRICH INDIRECT HEAT RADIATOR OVEN

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The greatest advance  
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USED FOR JAPANNING, LAC-  
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PROMPT SHIPMENT OF REGULAR  
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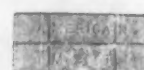
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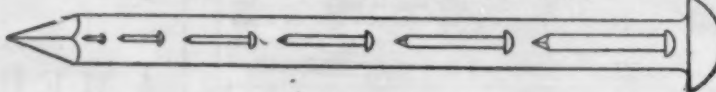
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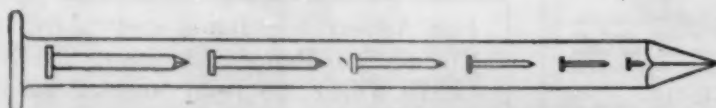
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**SITUATION WANTED**—By a Rolling Mill Engineer. Has had fifteen years' experience in zinc rolling mills. Ready to take a position in an aluminum, brass or copper mill. Address

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Care THE METAL INDUSTRY.

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**SITUATION WANTED**—By a Brass Foundry Foreman with references covering fifteen years, proving exceptional ability as executive and result getter, wishes position in the Spring with Eastern concern. Address

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**CASTING PROCESS,**  
Care THE METAL INDUSTRY.

**ELECTRO-PLATERS**

Anyone desiring the services of first class men for the electro-deposition of metals and finishing in all branches and departments of the plating business can secure such services by corresponding with the Secretary of the American Electro-Platers Society.

**JOHN E. STERLING,**  
468 Grand Avenue, Long Island City, N. Y.

**FOREMAN PLATER**

**SITUATION WANTED**—By a Foreman Plater who is thoroughly familiar with the mixing and maintaining of plating solutions. Can furnish the best of references. Address

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Care THE METAL INDUSTRY.

**ETCHER**

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# BUYERS' GUIDE: ADVERTISERS' PRODUCTS

## ABRASIVES (Also see Emery.)

**Artificial**  
General Abrasive Co., Niagara Falls, N. Y.  
Niagara Emery Mills, New York.  
Norton Co., Worcester, Mass.  
Stevens, Frederic B., Detroit, Mich.

**For Sand-Blasting**  
Pangborn Corporation, Hagerstown, Md.

## ACID-PROOF STONEWARE (See Acid Pumps; Dipping Baskets.)

**ACID PUMPS, STONEWARE**  
General Ceramics Co., New York.

## ACIDS

**Hydrofluoric**  
General Chemical Co., Philadelphia, Pa.  
**Nitric (Aqua Fortis.)**  
Celluloid Zapon Co., New York.  
**Oil of Vitriol (Sulphuric.)**  
Celluloid Zapon Co., New York.  
Hegeler Zinc Co., Danville, Ill.  
New Jersey Zinc Co., New York.

## ACCUMULATORS, HYDRAULIC (Also see Hydraulic Machinery.)

Waterbury Farrel Foundry & Machine Co., Waterbury, Conn.  
Watson-Stillman Co., New York.

## AIR BRUSHES AND ACCESSORIES (See Sprayers; Spraying Accessories.)

**AIR COMPRESSORS (Also see Centrifugal Air and Gas Compressors.)**  
DeVilbiss Mfg. Co., Toledo, O.  
Eclipse Air Brush Co., Newark, N. J.  
Eureka Pneumatic Spray Co., New York.  
General Electric Co., Schenectady, N. Y.  
New Haven Sand Blast Co., New Haven, Conn.  
Nikolas, G. J., Co., Chicago, Ill.  
Pangborn Corporation, Hagerstown, Md.  
Universal Sprayer Co., New York.

## AIR FILTERS (See Filters.)

**AIR TANKS**  
Nikolas, G. J., Co., Chicago, Ill.

## AIR AND GAS PRE-MIXING BURNERS (See Burners.)

**AEROPLANE DOPE**  
Celluloid Zapon Co., New York.  
Nikolas, G. J., Co., Chicago, Ill.

## ALLOYS (See Kind Wanted.)

**ALUMINUM (See Angles and Channels; Castings; Die Castings; Electrical Conductors; Fluxes; Forgings; Granulated Metals; Ingots; Leaf and Foli; Machined Products; Match Plates; Moldings and Extruded Shapes; Pipe; Powder; Rods and Bars; Sheets; Solder; Strip Metal; Tubes; Wire, Etc.)**

## ALUMINUM ALLOYS

Aluminum Co. of America, Pittsburgh, Pa.  
American Boron Products Co., Reading, Pa.  
Electric Smelting & Aluminum Co., Lockport, N. Y.  
Great Western Smelting & Refining Co., St. Louis, Mo.

## ALUMINUM DIE CASTINGS

Doehler Die Casting Co., Brooklyn, N. Y.

## AMMETERS (See also Electrical Apparatus and Equipment.)

Bolles Electric Co., L. I. City, New York.  
Connecticut Dynamo & Motor Co., Irvington, N. J.  
Crown Rheostat & Supply Co., Chicago, Ill.  
Eager Electric Co., Watertown, N. Y.  
Hanson & Van Winkle Co., Newark, N. J.  
Munning, A. P., & Co., New York-Chicago.  
Weston Electrical Instrument Co., Newark, N. J.

## AMMONIUM CHLORIDE

Roessler & Hasslacher Chemical Co., New York.

## AMYL ACETATE

Nikolas, G. J., Co., Chicago, Ill.

## ANGLES AND CHANNELS, ALUMINUM

Aluminum Co. of America, Pittsburgh, Pa.

## ANNEALING FURNACES

**Electric**  
Detroit Electric Furnace Co., Detroit, Mich.  
**Oil or Gas**  
Kenworthy, Chas. F., Waterbury, Conn.  
Monarch Engineering & Mfg. Co., Baltimore, Md.  
Rockwell, W. S., Co., New York.  
Surface Combustion Co., New York.

## ANNEALING MUFFLERS

## ANODES

**Brass and Bronze**  
American Platers' Supply Co., Chicago, Ill.  
Apothecaries Hall Co., Waterbury, Conn.  
Ayer-O'Connell Corp., Meriden, Conn.  
General Platers' Supply Co., New York.  
Hanson & Van Winkle Co., Newark, N. J.  
Harshaw, Fuller & Goodwin Co., Cleveland, O.  
Munning, A. P., & Co., New York-Chicago.  
Stevens, Frederic B., Detroit, Mich.  
U. S. Electro Galvanizing Co., Brooklyn, N. Y.

**Copper**  
American Platers' Supply Co., Chicago, Ill.  
Bolles Electric Co., L. I. City, New York.  
Harshaw, Fuller & Goodwin Co., Cleveland, O.  
Hussey, C. G., & Co., Pittsburgh, Pa.  
Munning, A. P., & Co., New York-Chicago.  
Stevens, F. B., Detroit, Mich.  
U. S. Electro Galvanizing Co., Brooklyn, N. Y.  
Warren Products Co., New York.

## Electrolytic Copper

Bolles Electric Co., L. I. City, New York.

## Gold

Handy & Harman, New York.

Ney, J. M., & Co., Hartford, Conn.

## Nickel

American Platers' Supply Co., Chicago, Ill.  
Apothecaries Hall Co., Waterbury, Conn.  
Ayer-O'Connell Corp., Meriden, Conn.  
Crown Rheostat & Supply Co., Chicago, Ill.  
Ely, C. Upham, New York.  
General Platers' Supply Co., New York.  
Hanson & Van Winkle Co., Newark, N. J.  
Harshaw, Fuller & Goodwin Co., Cleveland, O.  
Munning, A. P., & Co., New York-Chicago.  
U. S. Electro Galvanizing Co., Brooklyn, N. Y.  
Warren Products Co., New York.  
Woodison, E. J., Co., Detroit, Mich.

## Platinum

Handy & Harman, New York.  
Ney, J. M., & Co., Hartford, Conn.  
Roessler & Hasslacher Chemical Co., New York.

## Silver

Handy & Harman, New York.  
Jackson, John J., Co., Newark, N. J.  
Ney, J. M., & Co., Hartford, Conn.

## Zinc

American Platers' Supply Co., Chicago, Ill.  
Ayer-O'Connell Corp., Meriden, Conn.  
Galvanizing Corporation of America, Brooklyn, N. Y.  
Hanson & Van Winkle Co., Newark, N. J.  
Harshaw, Fuller & Goodwin Co., Cleveland, O.  
Munning, A. P., & Co., New York-Chicago.  
New Jersey Zinc Co., New York.

## ANTI-FRICTION METAL (Also see Babbitt Metal and Bearings.)

Union Smelting & Refining Co., Inc., Newark, N. J.

## ANTIMONY METAL

Leavitt, C. W., & Co., New York.

## ASSAYERS AND CHEMISTS (Also see Testing Laboratories.)

Ricketts & Co., Inc., New York.

## AUTOMATIC MACHINERY (See Bolt Heading, Trimming & Threading Machines; Buffing Machines; Cock Grinders; Cutting, Straightening and Forming Machines; Drying-out Machines; Dipping Baskets; Drop Lifters; Pickling Machines; Polishing Machines; Washing Machines.)

## AUTOMATIC POLISHING MACHINES

Excelsior Tool & Machine Co., E. St. Louis, Ill.

## AUTOMATIC WIRE AND SHEET METAL WORKING MACHINERY

Baird Machine Co., Bridgeport, Conn.

## AUTOMOBILE FORGINGS (Also see Forgings.)

American Manganese Bronze Co., Holmesburg, Philadelphia, Pa.

## BABBITT METAL (See also Bearings.)

Ajax Metal Co., Philadelphia, Pa.  
American Manganese Bronze Co., Holmesburg, Philadelphia, Pa.  
Electric Smelting & Aluminum Co., Lockport, N. Y.  
Frictionless Metal Co., Chattanooga, Tenn.  
Michigan Smelting & Refining Co., Detroit, Mich.  
Richards & Co., Boston, Mass.  
Union Smelting & Refining Co., Inc., Newark, N. J.  
United American Metals Corporation, Brooklyn, N. Y.  
U. S. Reduction Co., Chicago, Ill.

## BABBITT MOLDS (See Molds.)

## BALL BURNISHING EQUIPMENT (Also see Burnishing and Polishing Barrels.)

Abbott Ball Co., Hartford, Conn.  
Baird Machine Co., Bridgeport, Conn.  
Globe Machine & Stamping Co., Cleveland, Ohio.  
No-Dust Drying Machine Co., Providence, R. I.

## BALLS, STEEL (See Steel Balls.)

## BARS; SILVER, GOLD, PLATINUM

Handy & Harman, New York.

## BEARINGS (Also see Babbitt Metal and Anti-Friction Metal.)

### Babbitt

Ajax Metal Co., Philadelphia, Pa.  
Frictionless Metal Co., Chattanooga, Tenn.

## BENCHES FOR ENGRAVERS, JEWELERS, ETC.

Leiman Bros., New York.

## BLOWERS AND BLOW PIPING (See also Exhaust Fans and Heads.)

Astle, H. J., & Co., Providence, R. I.  
Cleveland Blow Pipe & Mfg. Co., Cleveland, O.  
Monarch Engineering & Mfg. Co., Baltimore, Md.  
New Haven Sand Blast Co., New Haven, Conn.

## BLOWERS, HIGH PRESSURE

Leiman Bros., New York.

## BOILER INSULATION (See Brick, Insulating; Insulation, Boiler; Insulating Cement.)

## BOILER SETTING (See Fire Cement.)

## BORONIC ALLOYS

American Boron Products Co., Reading, Pa.

## BOTTOM PLATES, STEEL

Wadsworth Core Machine & Equipment Co., Akron, O.

**BRASS (See Brass Mill Products; Wire Mill Products; Anodes; Briquet Ingots; Castings; Die Castings; Discs and Cups; Forgings; Ingots, Moldings and Extruded Shapes; Rods and Bars; Sheets; Strip Metal; Tubes; Wire.)**

## BRASS FOUNDERS (See Castings.)

## BRASS FOUNDRY EQUIPMENT & SUPPLIES (See Kind Wanted.)

## BRASS MILL ENGINEERS (See Engineers.)

## BRASS MILL MACHINERY (Also See Kind Wanted.)

Garrison, A., Foundry Co., Pittsburgh, Pa.  
Torrington Manufacturing Co., Torrington, Conn.  
Waterbury Farrel Foundry & Machine Co., Waterbury, Conn.  
Wolffgram, L., Erie, Pa.

## BRASS MILL PRODUCTS

Western Cartridge Co., East Alton, Ill.

## BRASS; SHEET WIRE; ROD, TUBE (Also see Wire Mill Products; Rods and Bars; Sheets; Strip Metals; Tubes; Wire, Etc.)

American Brass Company, Waterbury, Conn.  
Benson, H. K. & F. S., Glen Ridge, N. J.  
Bridgeport Brass Co., Bridgeport, Conn.  
Bristol Brass Co., Bristol, Conn.  
Chase Metal Works, Waterbury, Conn.  
Dallas Brass & Copper Co., Chicago, Ill.  
Dueber Watch Case Mfg. Co., Canton, O.  
Hendricks Bros., New York.  
Manhattan Brass Co., New York.  
New Jersey Tube Co., Harrison, N. J.  
Scovill Mfg. Co., Waterbury, Conn.  
Seymour Mfg. Co., Seymour, Conn.  
Taunton-New Bedford Copper Co., Taunton, Mass.  
Wheeler Condenser and Engineering Co., Carteret, N. J.

## BRASS MOLDERS FLASKS (See Flasks.)

## BRASS WORKING LATHES (See Lathes.)

## BRAZING SOLDER (See Solder.)

## BRICK (Also see Fire Brick.)

### Cork Paving

Armstrong Cork and Insulation Co., Pittsburgh, Pa.

### Insulating

Armstrong Cork and Insulating Co., Pittsburgh, Pa.

Quigley Furnace Specialties Co., New York.

## BRIQUETTING BRASS CHIPS, ETC.

General Briquetting Co., New York.

## BRIQUETTING MACHINES

General Briquetting Co., New York.

## BRITANNIA METAL

Standard Rolling Mills, Inc., Brooklyn, N. Y.

## BRONZE (See Anodes; Castings; Die Castings; Forgings; Ingots; Powder; Rods and Bars; Tubes; Etc.)

## BRONZING LIQUID

Celluloid Zapon Co., New York.  
Egyptian Lacquer Mfg. Co., New York.  
Nikolas, G. J., Co., Chicago, Ill.  
Waukegan Chemical Co., Waukegan, Ill.

# BUYERS' GUIDE: ADVERTISERS' PRODUCTS

## BRUSHES

**Hand**  
American Platers' Supply Co., Chicago, Ill.  
Blumenthal, H. & Co., New York.  
Egyptian Lacquer Mfg. Co., New York.  
Hanson & Van Winkle Co., Newark, N. J.  
Munnings, A. P. & Co., New York-Chicago.  
Nikolas, G. J., Co., Chicago, Ill.  
Osborn Manufacturing Co., Cleveland, Ohio.  
Paxson, J. W., Co., Philadelphia, Pa.  
Woodison, E. J., Co., Detroit, Mich.

**Sectional Wheel**  
Osborn Manufacturing Co., Cleveland, Ohio.

**Wheel**  
American Platers' Supply Co., Chicago, Ill.  
Blumenthal, H. & Co., New York.  
Hanson & Van Winkle Co., Newark, N. J.  
Munnings, A. P. & Co., New York-Chicago.  
Osborn Manufacturing Co., Cleveland, Ohio.  
Woodison, E. J., Co., Detroit, Mich.

**BUFFING CAKE, PLATINUM** (Also see Buffing and Polishing Compositions.)  
Munnings, A. P. & Co., New York-Chicago.

**BUFFING MACHINES, AUTOMATIC** (Also see Polishing Lathes and Heads.)  
Divine Bros. Co., Utica, N. Y.

## BUFFING AND POLISHING COMPOSITIONS

American Platers' Supply Co., Chicago, Ill.  
Apothecaries Hall Co., Waterbury, Conn.  
Ayer-O'Connell Corp., Meriden, Conn.  
Bennett & Seely, Bridgeport, Conn.  
Burns, E. Reed, Supply Co., Brooklyn, N. Y.  
Crown Rheostat & Supply Co., Chicago, Ill.  
General Platers Supply Co., New York.  
Hanson & Van Winkle Co., Newark, N. J.  
Harshaw, Fuller & Goodwin Co., Philadelphia, Pa.  
Munnings, A. P. & Co., New York-Chicago.  
Oden Corporation, Whitestone, L. I., N. Y.  
Stevens, Frederic B., Detroit, Mich.  
Warren Products Co., New York.  
Wiarda, John C. & Co., Brooklyn, N. Y.  
Woodison, E. J., Co., Detroit, Mich.

## BUFFING AND POLISHING WHEELS

(Also see Buffs.)  
**Canvas, Cotton, Etc.**  
American Platers' Supply Co., Chicago, Ill.  
Ayer-O'Connell Corp., Meriden, Conn.  
Bennett & Seely, Bridgeport, Conn.  
Crown Rheostat & Supply Co., Chicago, Ill.  
Divine Bros. Co., Utica, N. Y.  
Eastern Felt Co., Winchester, Mass.  
General Platers Supply Co., New York.  
Hanson & Van Winkle Co., Newark, N. J.  
Metal Industries Supply Co., Indianapolis, Ind.  
Milton Mfg. Co., Syracuse, N. Y.  
Munnings, A. P. & Co., New York-Chicago.  
Warren Products Co., New York.  
Woodison, E. J., Co., Detroit, Mich.

**Felt**  
Bacon Felt Co., Winchester, Mass.  
Divine Bros. Co., Utica, N. Y.  
Eastern Felt Co., Winchester, Mass.  
Hanson & Van Winkle Co., Newark, N. J.

**Leather**  
Divine Bros. Co., Utica, N. Y.

**Sheepskin**  
Metal Industries Supply Co., Indianapolis, Ind.  
Yorkville Mfg. Co., Brooklyn, N. Y.

## BUFFS

(Also see Buffing and Polishing Wheels.)  
Ayer-O'Connell Corp., Meriden, Conn.  
Burns, E. Reed, Supply Co., Brooklyn, N. Y.  
Crown Rheostat & Supply Co., Chicago, Ill.  
Divine Bros. Co., Utica, N. Y.  
General Platers Supply Co., New York.  
Hanson & Van Winkle Co., Newark, N. J.  
Metal Industries Supply Co., Indianapolis, Ind.  
Milton Mfg. Co., Syracuse, N. Y.  
Munnings, A. P. & Co., New York-Chicago.  
Oden Corporation, Whitestone, L. I., N. Y.  
Warren Products Co., New York.

## BUILDING PAINT SPRAYERS

DeVilbiss Mfg. Co., Toledo, O.

## BURNERS

(Also see Furnaces.)  
**Air and Gas Pre-Mixing**  
Buckeye Products Co., Cincinnati, Ohio.  
Maxon Furnace & Engineering Co., Muncie, Ind.  
Monarch Engineering & Mfg. Co., Baltimore, Md.

## BURNISHING AND POLISHING BARRELS

Abbott Ball Co., Hartford, Conn.  
American Platers' Supply Co., Chicago, Ill.  
Baird Machine Co., Bridgeport, Conn.  
Crown Rheostat & Supply Co., Chicago, Ill.  
Globe Machine & Stamping Co., Cleveland, O.  
Hanson & Van Winkle Co., Newark, N. J.  
Henderson Bros. Co., Waterbury, Conn.  
Munnings, A. P. & Co., New York-Chicago.  
No-Dust-Drying Machine Co., Providence, R. I.  
Smith-Richardson Co., Attleboro, Mass.

## BURNISHING COMPOUNDS AND CHIPS

(Also see Soap.)  
Abbott Ball Co., Hartford, Conn.  
International Chemical Co., Philadelphia, Pa.

## BURNISHING MATERIAL

No-Dust-Drying Machine Co., Providence, R. I.

**CABBAGING PRESSES** (See Presses; Scrap Baling Machines.)

**CALCIUM-COPPER** (See Ingots.)

**CANVAS WHEELS** (See Buffing and Polishing Wheels.)

**CASE HARDENING MATERIALS**  
Buchanan, C. G., Chemical Co., Cincinnati, O.

**CASTING METAL**  
Union Smelting & Refining Co., Inc., Newark, N. J.

**CASTINGS**  
**Aluminum**  
Aluminum Company of America, Pittsburgh, Pa.  
Light Mfg. & Foundry Co., Pottstown, Pa.

**Brass, Bronze and Composition**  
American Manganese Bronze Co., Holmesburg, Philadelphia, Pa.

**Iron Malleable**  
Malleable Iron Fittings Co., Branford, Conn.

**Nichrome**  
Driver-Harris Co., Harrison, N. J.

**Silver Metal**  
Silver Metal Mfg. Co., New York.

**Zinc**  
New Jersey Zinc Co., New York.

**CAUSTICIZED ASH**  
Solvay Process Co., Syracuse, N. Y.

**CAUSTIC SODA**  
Harshaw, Fuller & Goodwin Co., Philadelphia, Pa.  
Hunt, Philip A., Co., New York.  
International Chemical Co., Philadelphia, Pa.  
Roesler & Hasslacher Chemical Co., New York.  
Solvay Process Co., Syracuse, N. Y.

**CEMENT** (See Fire Cement; Insulating Cement.)

**CENTRIFUGAL DRYERS AND EXTRACTORS** (Also see Drying-Out Machines.)  
No-Dust-Drying Machine Co., Providence, R. I.  
Tolhurst Machine Works, Troy, N. Y.

**CHEMICALS, DEALERS IN ALL KINDS** (Also see Kind Wanted.)  
Ayer-O'Connell Corp., Meriden, Conn.  
Cooper, Chas. & Co., New York.  
Harshaw, Fuller & Goodwin Co., Philadelphia, Pa.

**CHEMISTS, CONSULTING** (See Assayers and Chemists; Testing Laboratories.)

**CHLORIDE OF IRON**  
Roesler & Hasslacher Chemical Co., New York.

**CHUCKS, SPINNING, ROUND & OVAL**  
Fryhill, P., Machine Co., New York.

**CINDER CRUSHERS** (See Crushers and Pulverizers; Reclaiming Machinery.)

**CLEANERS, METAL, WASTE, GENERAL**  
Oakley Chemical Co., New York.

**CLEANING APPARATUS, AUTOMATIC METAL** (Also see Pickling Machines.)  
Crescent Washing Machine Co., New Rochelle, N. Y.

Munnings, A. P. & Co., New York-Chicago.  
Pangborn Corporation, Hagerstown, Md.  
U. S. Electro Galvanizing Co., Brooklyn, N. Y.

**CLEANING COMPOUNDS** (See also Flg Cleaners; Pickling Compounds, Whale Oil Soaps.)

**Metal**  
American Platers' Supply Co., Chicago, Ill.  
Anthony, H. M., Co., New York.  
Apothecaries Hall Co., Waterbury, Conn.  
Ayer-O'Connell Corp., Meriden, Conn.  
Electric Smelting & Aluminum Co., Lockport, N. Y.

Ford, J. B., Co., Wyandotte, Mich.  
Fuller, W. A., Co., Greensburg, Pa.  
General Platers Supply Co., New York.  
Hanson & Van Winkle Co., Newark, N. J.  
International Chemical Co., Philadelphia, Pa.  
Munnings, A. P. & Co., New York-Chicago.  
Oakley Chemical Co., New York.  
Solvay Process Co., Syracuse, N. Y.  
Stevens, Frederic B., Detroit, Mich.  
Woodison, E. J., Co., Detroit, Mich.

**COAL AND ASH CONVEYORS**  
Portable Machinery Co., Passaic, N. J.

**COCK GRINDERS, AUTOMATIC**  
Turner Machine Co., Philadelphia, Pa.

**COLD ROLLED STAMPING STEEL**  
Hogan, John R., Co., Philadelphia, Pa.

**COMPOSITION METAL** (See Castings; Ingot; Etc.)

**COMPOSITIONS** (See Buffing and Polishing Compositions; Flooring Compositions.)

**COMPOUNDS, CUTTING AND GRINDING, DRAWING, STAMPING**  
Oakley Chemical Co., New York.

**COMPRESSORS, AIR & GAS** (See Air Compressors.)

**CONCENTRATING TABLES** (Also see Reclaiming Machinery.)  
Hardinge Company, New York.

**CONCENTRATORS, MAGNETIC**  
Dings Magnetic Separator Co., Milwaukee, Wis.

**CONTRACT WORK** (See Castings; Die-Castings; Dies; Electro-Galvanizing; Electro-Plating; Forgings; Hot Galvanizing and Tinning; Plating; Barrel Method; Polishing and Burnishing; Etc.)

**CONVEYOR MAGNETS**  
Dings Magnetic Separator Co., Milwaukee, Wis.

**CONVEYORS**  
**Portable**  
Portable Machinery Co., Passaic, N. J.  
**Belt, Coal and Ash**  
Portable Machinery Co., Passaic, N. J.

**COPPER** (Also see Anodes; Castings; Ingots; Rods and Bars; Sheets; Smelters and Refiners; Strip Metal; Tubes; Wire; Etc.)

**Casting**  
White & Bros., Inc., Philadelphia, Pa.

**Sheet, Wire, Rod, Tube**  
American Brass Co., Waterbury, Conn.  
Wheeler Condenser and Engineering Co., Carteret, N. J.

**COPPER-ALUMINUM, BORONIC**  
American Boron Products Co., Reading, Pa.

**COPPER BEARING MATERIAL, BUYERS OF** (Also see Drossers, Residues, Etc.)  
White & Bros., Inc., Philadelphia, Pa.

**COPPER, BORONIC**  
American Boron Products Co., Reading, Pa.

**COPPER, CARBONATE OF**  
Crown Rheostat & Supply Co., Chicago, Ill.  
Hanson & Van Winkle Co., Newark, N. J.  
Hunt, Philip A., Co., New York.  
Munnings, A. P. & Co., New York-Chicago.  
Wiarda, John C., Co., Brooklyn, N. Y.

**COPPER-CLAD WIRE, ROD, ETC.** (See Wire.)

**COPPER-CYANIDE**  
Roesler & Hasslacher Chemical Co., New York.

**COPPER-NICKEL, BORONIC**  
American Boron Products Co., Reading, Pa.

**CORE MACHINES**  
American Foundry Equipment Co., New York.  
Stevens, Frederic B., Detroit, Mich.  
Wadsworth Core Machine & Equipment Co., Akron, O.  
Woodison, E. J., Co., Detroit, Mich.

**CORE OILS AND COMPOUNDS**  
Buckeye Products Co., Cincinnati, Ohio.  
Stevens, Frederic B., Detroit, Mich.

**CORE OVEN INSULATION** (See Brick, Insulating; Insulating Cement; Insulation Oven.)

**CORE OVENS**  
**Coal and Coke**  
Buckeye Products Co., Cincinnati, Ohio.  
Monarch Engineering & Mfg. Co., Baltimore, Md.  
Obermayer, S., Co., Pittsburgh, Pa.  
Steiner, E., & Co., Newark, N. J.  
Stevens, Frederic B., Detroit, Mich.  
Wadsworth Core Machine & Equipment Co., Akron, O.  
Woodison, E. J., Co., Detroit, Mich.

**Oil and Gas**  
Buckeye Products Co., Cincinnati, Ohio.  
Monarch Engineering & Mfg. Co., Baltimore, Md.  
Obermayer, S., Co., Pittsburgh, Pa.  
Stevens, Frederic B., Detroit, Mich.  
Wadsworth Core Machine & Equipment Co., Akron, O.  
Woodison, E. J., Co., Detroit, Mich.

**CORE TRAYS, STEEL**  
Wadsworth Core Machine & Equipment Co., Akron, O.



## BUYERS' GUIDE: ADVERTISERS' PRODUCTS

## COUPLES

Dixon, Joseph, Crucible Co., Jersey City, N. J.

## CRANES, HAND, POWER AND ELECTRIC TRAVELING

Northern Engineering Works, Detroit, Mich.

## CRUCIBLES, GRAPHITE

Bartley, Jonathan, Crucible Co., Trenton, N. J.  
Dixon, Joseph, Crucible Co., Jersey City, N. J.  
Gautier, J. H., & Co., Jersey City, N. J.  
General Platers Supply Co., New York.  
McCullough-Dalzell Crucible Co., Pittsburgh, Pa.  
Seidel, R. B., Inc., Philadelphia, Pa.  
Stevens, Frederic B., Detroit, Mich.  
Taylor, Robt. J., Inc., Philadelphia, Pa.  
Vesuvius Crucible Co., Swisvale, Pa.  
Warren Products Co., New York.

## CRUCIBLE TONGS (See Tongs.)

## CRUSHERS AND PULVERIZERS (See also Reclaiming Machinery.)

Eastern Machinery Co., New Haven, Conn.  
Hardinge Company, New York.  
Standard Equipment Co., New Haven, Conn.

## CUPRO-NICKEL (See Brass Mill Products.)

## CUTTING, STRAIGHTENING &amp; FORMING MACHINERY

Wire  
Baird Machine Co., Bridgeport, Conn.  
Shuster, F. B., Co., New Haven, Conn.

## Strip Metal

Baird Machine Co., Bridgeport, Conn.  
Bliss, E. W., Co., Brooklyn, N. Y.  
Shuster, F. B., Co., New Haven, Conn.  
Waterbury Farrel Foundry & Machine Co., Waterbury, Conn.

## CYANIDE (See also Copper-Cyanide; Silver Cyanide; Cyanide; Sodium Cyanide; Zinc Cyanide.)

Crown Rheostat & Supply Co., Chicago, Ill.

## DEOXIDIZERS, METAL (See Fluxes.)

## DIE CASTING MACHINERY AND MOLDS

Doehler Die Casting Co., Brooklyn, N. Y.

## DIE CASTING METAL

Union Smelting & Refining Co., Inc., Newark, N. J.

## DIE-CASTING (Also see Castings, Die.)

Aluminum  
Aluminum Co. of America, Pittsburgh, Pa.  
Doehler Die Casting Co., Brooklyn, N. Y.  
Brass and Bronze  
Doehler Die Casting Co., Brooklyn, N. Y.  
White Metal  
Doehler Die Casting Co., Brooklyn, N. Y.  
Light Mfg. & Foundry Co., Pottstown, Pa.

## DIES, SHEET METAL WORKING

Bliss, E. W., Co., Brooklyn, N. Y.  
Globe Machine & Stamping Co., Cleveland, Ohio.

## DIPPING BASKETS

Automatic  
U. S. Electro Galvanizing Co., Brooklyn, N. Y.  
Heat-Resisting  
Driver-Harris Co., Harrison, N. J.  
Stoneware  
Ayer-O'Connell Corp., Meriden, Conn.  
General Ceramics Co., New York.  
Munning, A. P., & Co., New York-Chicago.  
Wire  
Ayer-O'Connell Corp., Meriden, Conn.  
Hanson & Van Winkle Co., Newark, N. J.  
Munning, A. P., & Co., New York-Chicago.  
Smith, John P., & Co., New Haven, Conn.

## DOORS AND PARTITIONS, STEEL

Lepton's, David, Sons Co., Philadelphia, Pa.

## DRAW BENCHES

Wire, Rod, Tube  
Waterbury Farrel Foundry & Machine Co., Waterbury, Conn.  
Watson-Stillman Co., New York.  
Wolffgram, L., Erie, Pa.  
Light Wire  
Leiman Bros., New York.

## DRAWING AND STAMPING (See Metal Goods Made to Order; Stamping and Drawing.)

## DRILLING MACHINES, LIGHT, SENSITIVE

Leiman Bros., New York.

## DRINKING WATER SUPPLY SYSTEMS

Armstrong Cork & Insulation Co., Pittsburgh, Pa.

## DROP HAMMERS

Bliss, E. W., Co., Brooklyn, N. Y.

## DROP LIFTERS (See also Presses, Drop Lifters for.)

Automatic  
Miner & Peck Mfg. Co., Derby, Conn.

## DROSSES, RESIDUES, ETC., BUYERS OF

(Also see Metal Dealers, Old.)  
Bailbach Smelting & Refining Co., Newark, N. J.  
Copper, Pass & Son, Ltd., Bristol, England.  
Nassau Smelting & Refining Co., New York.  
Loewenthal Co., Chicago, Ill.

## DRUMS, MAGNETIC

Dings Magnetic Separator Co., Milwaukee, Wis.

## DRY TUMBLING BARRELS

Universal Chain Co., Stroudsburg, Pa.

## DRYERS (See Centrifugal Dryers; Ovens; Drying-Out Machines; Ladle Heaters and Dryers; Mold Dryers; Sand Dryers; Sawdust Drying-Out Boxes.)

## DRYING-OUT MACHINES (See also Centrifugal Dryers and Extractors; Sawdust Drying-Out Boxes.)

Baird Machine Co., Bridgeport, Conn.  
Smith-Richardson Co., Attleboro, Mass.

## Automatic

Astle, H. J., & Co., Providence, R. I.  
No-Dust-Drying Machine Co., Providence, R. I.  
Tolhurst Machine Works, Troy, N. Y.  
U. S. Electro Galvanizing Co., Brooklyn, N. Y.

## DUST ARRESTORS

American Foundry Equipment Co., New York.  
Pangborn Corporation, Hagerstown, Md.

## DUST COLLECTORS AND VENTILATING SYSTEMS (Also see Exhaust Fans and Heads.)

Astle, H. J., & Co., Providence, R. I.  
Cleveland Blow Pipe & Mfg. Co., Cleveland, O.  
Kirk & Blum Co., Cincinnati, O.  
No-Dust-Drying Machine Co., Providence, R. I.  
Pangborn Corporation, Hagerstown, Md.

## DYNAMOS, LOW VOLTAGE, PLATING AND GALVANIZING (Also see Electrical Apparatus and Equipment.)

American Platers' Supply Co., Chicago, Ill.  
Ayer-O'Connell Corp., Meriden, Conn.  
Bogue, Chas. J., Electric Co., New York.  
Boisier Electric Co., L. I. City, New York.  
Connecticut Dynamo & Motor Co., Newark, N. J.  
Crown Rheostat & Supply Co., Chicago, Ill.  
Eager Electric Co., Watertown, N. Y.  
General Electric Co., Schenectady, N. Y.  
Green, W., Electric Co., New York.  
Hanson & Van Winkle Co., Newark, N. J.  
Jantz & Leist Electric Co., Cincinnati, O.  
Munning, A. P., & Co., New York-Chicago.  
Stevens, Frederic B., Detroit, Mich.  
U. S. Electro Galvanizing Co., Brooklyn, N. Y.  
Warren Products Co., New York.

## ELECTRICAL APPARATUS AND EQUIPMENT (Also see Ammeters, Rheostats, Switchboards, Transformers, Voltmeters.)

Ayer-O'Connell Corp., Meriden, Conn.  
Bogue, Chas. J., Electric Co., New York.  
Eager Electric Co., Watertown, N. Y.  
General Electric Co., Schenectady, N. Y.  
Munning, A. P., & Co., New York-Chicago.  
Weston Electrical Instrument Co., Newark, N. J.

## ELECTRIC CRANES (See Cranes.)

## ELECTRICAL CONDUCTORS, ALUMINUM

Aluminum Company of America, Pittsburgh, Pa.

## ELECTRIC FURNACES

Heat Treating  
General Electric Co., Schenectady, N. Y.  
Laboratory  
General Electric Co., Schenectady, N. Y.  
Melting  
Ajax Metal Co., Philadelphia, Pa.  
Detroit Electric Furnace Co., Detroit, Mich.  
General Electric Co., Schenectady, N. Y.  
Pittsburgh Electric Furnace Corporation, Pittsburgh, Pa.

## ELECTRIC HOISTS (See Hoists.)

## ELECTRIC OVENS (See Ovens; Also Core Ovens.)

## ELECTRO-GALVANIZING, JOB AND CONTRACT

Galvanizing Corp. of America, Brooklyn, N. Y.  
Globe Machine & Stamping Co., Cleveland, Ohio.  
Hassall, John, Inc., Brooklyn, N. Y.  
Munning, A. P., & Co., New York-Chicago.  
U. S. Electro Galvanizing Co., Brooklyn, N. Y.

## ELECTRO GALVANIZING EQUIPMENT AND SUPPLIES (See Dynamos; Plating Barrels; Plating Machines, Automatic; Tanks, etc.)

## ELECTRO GALVANIZING MACHINES, AUTOMATIC (See Plating Machines, Automatic.)

## ELECTRO GALVANIZING SOLUTION

Galvanizing Corporation of America, Brooklyn, N. Y.

## ELECTRIC MAGNETIC SEPARATORS

Dings Magnetic Separator Co., Milwaukee, Wis.

## ELECTRO PLATING, JOB &amp; CONTRACT

(Also see Aluminum, Electro Plating of; Polishing and Burnishing; Plating, Barrel Method.)

Cohan-Epner Co., New York.  
Globe Machine & Stamping Co., Cleveland, Ohio.  
Hassall, John, Inc., Brooklyn, N. Y.  
Pratt-Henry Electric Co., New York.  
Slewing, Philip, New York.  
Wernick Brothers, New York.

## ELECTRO PLATING EQUIPMENT AND SUPPLIES (See Kind Wanted.)

## EMERY (Also see Abrasives.)

American Platers' Supply Co., Chicago, Ill.  
Crown Rheostat & Supply Co., Chicago, Ill.  
Hanson & Van Winkle Co., Newark, N. J.  
Munning, A. P., & Co., New York-Chicago.  
Niagara Emery Mills, New York.  
Stevens, Frederic B., Detroit, Mich.  
Warren Products Co., New York.

## ENAMELING OVENS (See Ovens.)

## ENAMELS

## Colored

Celluloid Zapon Co., New York.  
Du Pont, E. I., de Nemours & Co., Wilmington, Del.  
Egyptian Lacquer Mfg. Co., New York.  
Hilo Varnish Corporation, Brooklyn, N. Y.  
Maas & Waldstein Co., New York.  
Nikolas, G. J., & Co., Chicago, Ill.  
Waukegan Chemical Co., Waukegan, Ill.

## Lacquer

Apothecaries Hall Co., Waterbury, Conn.  
Celluloid Zapon Co., New York.  
Du Pont, E. I., de Nemours & Co., Wilmington, Del.  
Egyptian Lacquer Mfg. Co., New York.  
Hanson & Van Winkle Co., Newark, N. J.  
Hilo Varnish Corporation, Brooklyn, N. Y.  
Maas & Waldstein Co., New York.  
Nikolas, G. J., Co., Chicago, Ill.  
United States Lacquer Co., Inc., Brooklyn, N. Y.  
Waukegan Chemical Co., Waukegan, Ill.

## Wood

Celluloid Zapon Co., New York.  
Du Pont, E. I., de Nemours & Co., Wilmington, Del.  
Egyptian Lacquer Mfg. Co., New York.  
Hilo Varnish Corporation, Brooklyn, N. Y.  
United States Lacquer Co., Inc., Brooklyn, N. Y.  
Waukegan Chemical Co., Waukegan, Ill.

## ENAMEL SPRAYERS (See Sprayers.)

## ENGINEERS

## Consulting

Lane, H. M., Co., Detroit, Mich.

## Foundry

Lane, H. M., Co., Detroit, Mich.  
Pangborn Corporation, Hagerstown, Md.

## Fuel

Maxon Furnace & Engineering Co., Muncie, Ind.

## Furnace

Kenworthy, Chas. F., Waterbury, Conn.  
Maxon Furnace & Engineering Co., Muncie, Ind.  
Monarch Engineering & Mfg. Co., Baltimore, Md.  
Quigley Furnace Specialties Co., New York.  
Rockwell, W. S., Co., New York.

## Industrial

Knoepfel, C. E., & Co., Inc., New York.  
Lane, H. M., Co., Detroit, Mich.  
McKenzie Churchhill Corporation, New York.

## Industrial Cleaning

Oakley Chemical Co., New York.

## Metal Finishing

Divine Bros. Co., Utica, N. Y.

## Polishing and Grinding

Divine Bros. Co., Utica, N. Y.  
Norton Co., Worcester, Mass.

## Powdered Coal Burning

Quigley Furnace Specialties Co., New York.

## ESCUTCHEON PINS, ALL METAL

Hassall, John, Inc., Brooklyn, N. Y.

## EXHAUST FANS AND HEADS (Also see Blowers and Blow Piping; Dust Collectors and Ventilating Systems.)

Cleveland Blow Pipe & Mfg. Co., Cleveland, O.

## ETHYL ACETATE

Du Pont, E. I., de Nemours & Co., Wilmington, Del.  
Nikolas, G. J., Co., Chicago, Ill.

## EXTRUDED MOLDINGS AND SHAPERS (See Moldings, Etc.)

## FACINGS (See Foundry Facings.)

## FELT POLISHING WHEELS (Also see Buffing and Polishing Wheels.)

American Platers' Supply Co., Chicago, Ill.  
Bacon Felt Co., Winchester, Mass.  
Crown Rheostat & Supply Co., Chicago, Ill.  
Divine Bros. Co., Utica, N. Y.  
Eastern Felt Co., Winchester, Mass.  
Hanson & Van Winkle Co., Newark, N. J.  
Munning, A. P., & Co., New York-Chicago.

## FELT SHEETS

Bacon Felt Co., Winchester, Mass.  
Eastern Felt Co., Winchester, Mass.



# BUYERS' GUIDE: ADVERTISERS' PRODUCTS

**FIG CLEANERS** (Also See Cleaning Compounds, Whale Oil Soap.)  
International Chemical Co., Philadelphia, Pa.

**FILM COATINGS**  
Waukegan Chemical Co., Waukegan, Ill.

**FILTERS, AIR**  
DeVilbiss Mfg. Co., Toledo, Ohio.  
Nikolas, G. J., Co., Chicago, Ill.

**FIRE CEMENT**  
Buckeye Products Co., Cincinnati, Ohio.  
Campbell-Hausfeld Co., Harrison, Ohio.  
Crescent Refractories Co., Curwensville, Pa.  
King Refractories Co., New York.  
Obermayer, S. Co., Pittsburgh, Pa.  
Pecora Paint Co., Philadelphia, Pa.  
Quigley Furnace Specialties Co., New York.

**FIRE EXTINGUISHERS**  
American-La France Fire Engine Co., Inc., Elmira, N. Y.

**FIRE EQUIPMENT**  
American-La France Fire Engine Co., Inc., Elmira, N. Y.

**FIRST AID EQUIPMENT & SUPPLIES**  
American-La France Fire Engine Co., Inc., Elmira, N. Y.

**FLASKS, BRASS MOLDERS**  
American Foundry Equipment Co., New York.  
Bennett & Seelye, Bridgeport, Conn.  
Buckeye Products Co., Cincinnati, Ohio.

**FLOORING COMPOSITION**  
Armstrong Cork & Insulation Co., Pittsburgh, Pa.

**FLUXES**  
Galvanizing  
Celluloid Zapon Co., New York.  
Metal Melting  
American Boron Products Co., Reading, Pa.  
Buckeye Products Co., Cincinnati, Ohio.  
Obermayer, S. Co., Pittsburgh, Pa.  
Soldering Gold and Silver  
Ney, J. M. Co., Hartford, Conn.  
Soldering and Tinning  
Aluminum Co. of America, Pittsburgh, Pa.  
Celluloid Zapon Co., New York.

**FOIL** (See Leaf and Foil.)

**FORGES, OIL**  
Wayne Oil Tank & Pump Co., Ft. Wayne, Ind.

**FORGINGS** (Also see Automobile Forgings.)  
Aluminum  
Aluminum Co. of America, Pittsburgh, Pa.  
Brass and Bronze  
Scovill Mfg. Co., Waterbury, Conn.

**FOUNDRY EQUIPMENT AND SUPPLIES** (See Kind Wanted.)

**FOUNDRY ENGINEERS** (See also Engineers.)  
Lane, H. M., Co., Detroit, Mich.

**FOUNDRY FACINGS**  
Buckeye Products Co., Cincinnati, Ohio.  
Obermayer, S. Co., Pittsburgh, Pa.  
Paxon, J. W., Co., Philadelphia, Pa.  
Stevens, Frederic B., Detroit, Mich.  
Woodson, B. J., Co., Detroit, Mich.

**FOUNDRY RIDDLES** (See Sand Sifters.)

**FOUNDRY SPRAYERS** (See Sprayers.)

**FRICTIONS**  
Divine Bros. Co., Utica, N. Y.

**FUEL OIL, FURNACES**  
Wayne Oil Tank & Pump Co., Ft. Wayne, Ind.  
Oil or Gas

Buckeye Products Co., Cincinnati, Ohio.  
Campbell-Hausfeld Co., Harrison, Ohio.  
Gehrich Indirect Heat Oven Co., Long Island City, N. Y.  
Hawley Down-Draft Furnace Co., Easton, Pa.  
Improved Appliance Co., Brooklyn, N. Y.  
Mine & Smelter Supply Co., New York.  
Monarch Engineering & Mfg. Co., Baltimore, Md.  
Rockwell, W. S., Co., New York.  
Surface Combustion Co., New York.  
Powdered Coal  
Quigley Furnace Specialties Co., New York.

**FURNACE CEMENT** (See Fire Cement.)

**FURNACE ENGINEERS** (See Engineers.)

**FURNACE INSULATION** (See Brick, Insulating; Insulating Cement; Insulation, Furnace.)

**FURNACES** (See Annealing Furnaces; Burners; Electric Furnaces; Galvanizing & Tinning Furnaces; Heat Treating Furnaces; Melting Furnaces; Powdered Coal Burning Furnaces; Smelting Furnaces.)

**FURNACES, POWDERED COAL BURNING**  
Quigley Furnace Specialties Co., New York.

**FURNACE TILE AND LININGS** (Also see Fire Brick.)  
Buckeye Products Co., Cincinnati, Ohio.  
Crescent Refractories Co., Curwensville, Pa.  
Monarch Engineering & Mfg. Co., Baltimore, Md.

**FUSEL OIL**  
Nikolas, G. J., & Co., Chicago, Ill.

**GALVANIZING** (See also Electro Galvanizing, Job, and Contract; Hot Galvanizing, Job and Contract.)  
New Jersey Zinc Co., New York.

**GALVANIZING AND TINNING FURNACES** (Also see Burners.)  
Improved Appliance Co., Brooklyn, N. Y.  
Monarch Engineering & Mfg. Co., Baltimore, Md.

**GALVANIZING EQUIPMENT AND SUPPLIES** (See Kinds Wanted. Also Plating and Galvanizing Barrels; Plating and Galvanizing Machines, Automatic; Hot Galvanizing and Tinning Equipment.)

**GAS BURNERS** (See Burners.)

**GAS MASKS**  
American-La France Fire Engine Co., Inc., Elmira, N. Y.

**GATE CUTTERS** (See Saws; Sprue Cutters.)

**GAUGES, OIL TANK**  
Wayne Oil Tank & Pump Co., Ft. Wayne, Ind.

**GENERATORS** (See Dynamos; Motor-Generator Sets.)

**GLOVES**  
Sand Blast  
Pangborn Corporation, Hagerstown, Md.

**GLUE FOR POLISHING**  
Divine Bros. Co., Utica, N. Y.

**GLUE HEATERS AND POTS**  
Divine Bros. Co., Utica, N. Y.  
General Electric Co., Schenectady, N. Y.

**GOGGLES**  
American-La France Fire Engine Co., Inc., Elmira, N. Y.

**GOLD** (See Anodes; Bars; Metal Dealers; Smelters and Refiners.)

**GOLD BORONIC**  
American Boron Products Co., Reading, Pa.

**GRAPHITE PRODUCTS, PHOSPHORIZERS, STIRRERS, ETC.** (Also see Crucibles.)

Bartley, Jonathan, Crucible Co., Trenton, N. J.  
Dixon, Joseph, Crucible Co., Jersey City, N. J.  
Gautier, J. H., & Co., Jersey City, N. J.  
McCullough-Dalzell Crucible Co., Pittsburgh, Pa.  
Seidel, R. B., Inc., Philadelphia, Pa.  
Taylor, Robt. J., Inc., Philadelphia, Pa.  
Vesuvius Crucible Co., Swissvale, Pa.

**GRINDING, FLEXIBLE**  
Divine Bros. Co., Utica, N. Y.

**GRINDING MACHINES**  
Connecticut Dynamo & Motor Co., Newark, N. J.  
Divine Bros. Co., Utica, N. Y.  
Munning, A. P., & Co., New York-Chicago.  
Norton Co., Worcester, Mass.  
Stevens, Frederic B., Detroit, Mich.

**GRINDING WHEEL HOODS** (See Dust Collectors and Ventilating Systems; Hoods.)

**HANDLING CONVEYORS**  
Portable Machinery Co., Passaic, N. J.

**HARDNESS TESTING APPARATUS** (Also see Scleroscopes.)  
Shore Instrument Co., Jamaica, N. Y.

**HEAT TREATING FURNACE**  
Rockwell, W. S., Co., New York.

**HOISTS** (Also see Cranes.)  
Air, Chain, Electric, Pneumatic, Hydraulic  
Northern Engineering Works, Detroit, Mich.

**HOODS** (Also see Dust Collectors and Ventilating Systems.)  
Polishing and Grinding Wheel  
Cleveland Blow Pipe & Mfg. Co., Cleveland, Ohio.  
Kirk & Rlum Co., Cincinnati, Ohio.  
Spraying  
De Vilbiss Mfg. Co., Toledo, Ohio.  
Eclipse Air Brush Co., Newark, N. J.

**HOT GALVANIZING AND TINNING; JOB AND CONTRACT**  
Malleable Iron Fittings Co., Branford, Conn.  
New Standard Hardware Works, Mount Joy, Pa.

**HOT TINNING SUPPLIES** (See Hot Galvanizing and Tinning Equipment.)

**HOT GALVANIZING AND TINNING EQUIPMENT** (Also see Burners; Galvanizing and Tinning Furnaces; Kettles; Tanks.)  
New Standard Hardware Works, Mount Joy, Pa.

**HOT TINNING** (See Hot Galvanizing and Tinning.)

**HYDRAULIC MACHINERY, PRESSES, JACKS, ETC.** (Also see Accumulators; Presses.)  
Waterbury Farrel Foundry & Machine Co., Waterbury, Conn.  
Watson-Stillman Co., New York.

**INDUSTRIAL ENGINEERS**  
Knoepfel, C. E., & Co., Inc., New York.  
Lane, H. M., Co., Detroit, Mich.  
McDonald-Churchill Corporation, New York.

**INGOT MOLDS** (See Molds.)

**INGOTS** (Also see Calcium-Copper; Manganese-Copper; Phosphor-Copper; Phosphor-Tin; Silicon-Copper; Smelters and Refiners.)

**Aluminum**  
Aluminum Company of America, Pittsburgh, Pa.  
British Aluminum Co., New York and Toronto, Ontario.  
Electric Smelting & Aluminum Co., Lockport, N. Y.  
Great Western Smelting & Refining Co., St. Louis, Mo.  
Leygrand & Co., New York.  
Loewenthal Co., Chicago, Ill.  
U. S. Reduction Co., Chicago, Ill.

**Aluminum Bronze**  
Electric Smelting & Aluminum Co., Lockport, N. Y.  
Brass, Bronze and Composition  
Ajax Metal Co., Philadelphia, Pa.  
Birkenstein, S., & Sons, Chicago, Ill.  
Henning, V., & Sons, Brooklyn, N. Y.  
Loewenthal Co., Chicago, Ill.  
Richards & Co., Boston, Mass.  
Whipple & Choate, Bridgeport, Conn.  
White & Bro., Philadelphia, Pa.

**Copper**  
Baibach Smelting & Refining Co., Newark, N. J.  
Baltimore Copper Smelting & Rolling Co., Baltimore, Md.  
Hendricks Bros., New York.  
Richards & Co., Boston, Mass.  
Trotter, Nathan & Co., Philadelphia, Pa.  
White & Bro., Inc., Philadelphia, Pa.

**Lead**  
United Metals Selling Co., New York.

**Manganese-Bronze**  
American Manganese Bronze Co., Holmesburg, Philadelphia, Pa.  
Electric Smelting & Aluminum Co., Lockport, N. Y.  
Richards & Co., Boston, Mass.

**Silver Metal**  
Silver Metal Mfg. Co., New York.

**Silver Metal**  
Handy & Harman, New York.

**Slab Zinc**  
Richards & Co., Boston, Mass.

**Tin**  
Baltimore Copper Smelting & Rolling Co., Baltimore, Md.  
Richards & Co., Boston, Mass.  
U. S. Reduction Co., Chicago, Ill.

**White Metals**  
Michigan Smelting & Refining Co., Detroit, Mich.

**INSTRUMENTS** (Electrical Measuring.)  
Weston Electrical Instrument Co., Newark, N. J.

**INSULATING BRICK** (See Brick.)

**INSULATING CEMENT, HEAT**  
Armstrong Cork and Insulation Co., Pittsburgh, Pa.  
Quigley Furnace Specialties Co., New York.

**INSULATION** (Also see Brick, Insulating; Insulating Cement.)

**Boiler**  
Armstrong Cork & Insulation Co., Pittsburgh, Pa.  
Quigley Furnace Specialties Co., New York.

**Oven**  
Armstrong Cork & Insulation Co., Pittsburgh, Pa.  
Quigley Furnace Specialties Co., New York.

**Furnace**  
Armstrong Cork & Insulation Co., Pittsburgh, Pa.  
Quigley Furnace Specialties Co., New York.

**Pipe**  
Armstrong Cork & Insulation Co., Pittsburgh, Pa.

**IRON CASTINGS** (See Castings.)

**JAPANNING BARRELS** (See Tumbling Barrels.)

**JAPANNING OVENS** (See Ovens.)

**JAPANS, ALL KINDS**  
Hilo Varnish Corporation, Brooklyn, N. Y.

## BUYERS' GUIDE: ADVERTISERS' PRODUCTS

## JEWELERS' BRUSHES (See Brushes.)

## JEWELERS' EQUIPMENT

(Also see Kind Wanted.)

Leiman Bros., New York.  
Smith-Richardson Co., Attleboro, Mass.

## JEWELERS' ROLLS (See Rolls.)

## JEWELERS' SOLDER (See Solders.)

## JIGS, FIXTURES, ETC. (See Tools, Jigs, Fixtures.)

## KETTLES

Hot Galvanizing and Tinning

New Standard Hardware Works, Mount Jay, Pa.

## LABORATORIES (See Textile Laboratories.)

## LACQUERING BARRELS (See Tumbling Barrels.)

## LACQUER ENAMELS (See Enamels.)

## LACQUER OVENS (See Ovens.)

## LACQUERS

Colored

Celluloid Zapon Co., New York.

Du Pont, E. I., de Nemours &amp; Co., Wilmington, Del.

Egyptian Lacquer Mfg. Co., New York.

Hilo Varnish Corporation, Brooklyn, N. Y.

Maas &amp; Waldstein Co., New York.

Nikolas, G. J., Co., Chicago, Ill.

Waukegan Chemical Co., Waukegan, Ill.

Metal

Apothecaries Hall Co., Waterbury, Conn.

Celluloid Zapon Co., New York.

Du Pont, E. I., de Nemours &amp; Co., Wilmington, Del.

Egyptian Lacquer Mfg. Co., New York.

Hanson &amp; Van Winkle Co., Newark, N. J.

Maas &amp; Waldstein Co., New York.

Nikolas, G. J., Co., Chicago, Ill.

United States Lacquer Co., Inc., Brooklyn, N. Y.

Waukegan Chemical Co., Waukegan, Ill.

Wood

Celluloid Zapon Co., New York.

Du Pont, E. I., de Nemours &amp; Co., Wilmington, Del.

United States Lacquer Co., Inc., Brooklyn, N. Y.

Waukegan Chemical Co., Waukegan, Ill.

## LACQUER SPRAYERS (See Sprayers.)

## LADLE HEATERS AND DRYERS

Hawley Down-Draft Furnace Co., Easton, Pa.

Monarch Engineering &amp; Mfg. Co., Baltimore, Md.

## LAPODARY MACHINERY, GEM STONE

Leiman Bros., New York.

## LATHES (Also see Polishing Lathes.)

Spinning

Riliss E. W., Co., Brooklyn, N. Y.

Prybil, P., Machine Co., New York.

## LEAD, PIG AND BAR

American Zinc, Lead &amp; Smelting Co., New York.

Baltimore Copper Smelting &amp; Rolling Co., Baltimore, Md.

Chadwick-Boston Co., Boston, Mass.

Union Smelting &amp; Refining Co., Inc., Newark, N. J.

## LEAD PIPE AND TUBING

Union Smelting &amp; Refining Co., Inc., Newark, N. J.

## LEAD WIRE AND RIBBON

Union Smelting &amp; Refining Co., Inc., Newark, N. J.

## LEAD-LINED TANKS (See Tanks.)

## LEAF AND FOIL, ALUMINUM

Aluminum Company of America, Pittsburgh, Pa.

## LEATHER POLISHING WHEELS (See Buffing and Polishing Wheels.)

## LEATHER FOR DRY BARREL POLISHING

Peckham Mfg. Co., Newark, N. J.

## LOCOMOTIVES, INDUSTRIAL (See Electric Locomotives.)

## LUBRICANTS, Cutting and Grinding, Drawing, Stamping.

Oakley Chemical Co., New York.

## MACHINERY, DIE CASTING

Doehler Die Casting Co., Brooklyn, N. Y.

## MAGNESIUM METAL

Sheet, Wire, Rod, Ribbon, Powder

Leavitt, C. W., &amp; Co., New York.

Norton Laboratories, New York.

## MAGNETIC CONCENTRATORS

Dings Magnetic Separator Co., Milwaukee, Wis.

## MAGNETIC DRUMS

Dings Magnetic Separator Co., Milwaukee, Wis.

## MAGNETIC PULLEYS

Dings Magnetic Separator Co., Milwaukee, Wis.

## MAGNETIC SEPARATORS (See also Reclaiming Machinery.)

Magnetic Mfg. Co., Milwaukee, Wis.

Paxson, J. W., Co., Philadelphia, Pa.

## MAGNETS

Electro

Dings Magnetic Separator Co., Milwaukee, Wis.

High Intensity

Dings Magnetic Separator Co., Milwaukee, Wis.

Standard and Special

Dings Magnetic Separator Co., Milwaukee, Wis.

## MANGANESE, 98.99%

Metal &amp; Thermit Corporation, New York.

## MANGANESE-BRONZE (See Ingots.)

## MANGANESE-COPPER (Also see Ingots.)

Electric Smelting &amp; Aluminum Co., Lockport, N. Y.

Lang, R. F., New York.

Metal &amp; Thermit Corporation, New York.

## MANTLE DIP

Nikolas, G. J., Co., Chicago, Ill.

## MELTING FURNACES (Also see Burners; Galvanizing and Tinning Furnaces; Tank Furnaces.)

Brass

Detroit Electric Furnace Co., Detroit, Mich.

Wayne Oil Tank &amp; Pump Co., Ft. Wayne, Ind.

Woodison, E. J., Co., Detroit, Mich.

Electric

Detroit Electric Furnace Co., Detroit, Mich.

Pittsburgh Electric Furnace Corporation, Pittsburgh, Pa.

Coal and Coke

Buckeye Products Co., Cincinnati, Ohio.

Ideal Furnace Co., Chester, Pa.

Monarch Engineering &amp; Mfg. Co., Baltimore, Md.

Obermayer, S., Co., Pittsburgh, Pa.

Woodison, E. J., Co., Detroit, Mich.

Oil or Gas

Buckeye Products Co., Cincinnati, Ohio.

Campbell-Hausfeld Co., Harrison, Ohio.

Hawley Down-Draft Furnace Co., Easton, Pa.

Ideal Furnace Co., Chester, Pa.

Kenworthy, Chas. F., Waterbury, Conn.

Maxon Furnace &amp; Engineering Co., Muncie, Ind.

Monarch Engineering &amp; Mfg. Co., Baltimore, Md.

Obermayer, S., Co., Pittsburgh, Pa.

Rockwell, W. S., Co., New York.

Wayne Oil Tank &amp; Pump Co., Ft. Wayne, Ind.

Pit

Buckeye Products Co., Cincinnati, Ohio.

Monarch Engineering &amp; Mfg. Co., Baltimore, Md.

Paxson, J. W., Co., Philadelphia, Pa.

Stevens, Frederic B., Detroit, Mich.

Reverberatory

Hawley Down-Draft Furnace Co., Easton, Pa.

Monarch Engineering &amp; Mfg. Co., Baltimore, Md.

Rockwell, W. S., Co., New York.

Soft Metal

Improved Appliance Co., Brooklyn, N. Y.

Tilting, Crucible

Wayne Oil Tank &amp; Pump Co., Ft. Wayne, Ind.

Tilting, Non-Crucible

Wayne Oil Tank &amp; Pump Co., Ft. Wayne, Ind.

## METAL BRIQUETTES (See Briquet-Ingots.)

## METAL CLEANERS (See also Cleaning Compounds.)

Ford, J. B., Co., Wyandotte, Mich.

Fuller, W. A., Co., Greensburg, Pa.

Oakley Chemical Co., New York.

Solvay Process Co., Syracuse, N. Y.

## METAL DEALERS (Also see Drosses, Residues, Etc., Buyers of; Turnings, Chips, Etc., Buyers of.)

Gold, Silver, Platinum

Ney, J. M., &amp; Co., Hartford, Conn.

Radnal, Josef, New York.

Roessler &amp; Hasslacher Chemical Co., New York.

New Metals

Nasau Smelting &amp; Refining Co., New York.

North Atlantic Metal Corporation, New York.

Trotter, Nathan, &amp; Co., Philadelphia, Pa.

Old Metals

Henning, V., &amp; Sons, Brooklyn, N. Y.

Metal Purchasing Co., New York.

Rare Metals

North Atlantic Metal Corporation, New York.

Radnal, Josef, New York.

Zinc

New Jersey Zinc Co., New York.

## METAL GOODS MADE TO ORDER (Also see Stamping and Drawing.)

Chase Metal Works, Waterbury, Conn.

Kenworthy, Charles F., Inc., Waterbury, Conn.

Scovill Mfg. Co., Waterbury, Conn.

Western Cartridge Co., East Alton, Ill.

## METALS (See kinds Wanted. Also Metal Dealers.)

## METAL RECLAIMING EQUIPMENT (See Concentrating Tables; Crushers and Pulverizers; Magnetic Separators.)

## METAL PARTS WASHING MACHINES

Crescent Washing Machine Co., New Rochelle, N. Y.

## METALS, PLATED SHEET (See Plated and Polished Sheet Metals; Sheets.)

## METALS, RARE (See Metal Dealers.)

## METERS (Electrical Measuring.)

General Electric Co., Schenectady, N. Y.

Weston Electrical Instrument Co., Newark, N. J.

## METERS, OIL, GASOLINE, KEROSENE, ETC.

Wayne Oil Tank &amp; Pump Co., Ft. Wayne, Ind.

## MILLS, CRUSHING (Also see Crushers and Pulverizers.)

Hardinge Company, New York.

## MINERAL MAGNETIC SEPARATORS

Dings Magnetic Separator Co., Milwaukee, Wis.

## MIXERS, SWEEPS-MIXING MACHINERY

## MOLD DRYERS, PORTABLE

Monarch Engineering &amp; Mfg. Co., Baltimore, Md.

## MOLDING MACHINES

Hand-Operated

Turner Machine Co., Philadelphia, Pa.

Power

American Foundry Equipment Co., New York.

Osborn Manufacturing Co., Cleveland, Ohio.

Turner Machine Co., Philadelphia, Pa.

## MOLDING SAND (See Sand.)

## MOLDINGS AND EXTRUDED SHAPES, ALUMINUM

Aluminum Company of America, Pittsburgh, Pa.

## MOLDS

Babbitt and Solder

Schweizer, Chas. K., St. Louis, Mo.

Ingot

Schweizer, Chas. K., St. Louis, Mo.

## MOLD SPRAYERS (See Sprayers.)

## MOTOR CONTROL EQUIPMENT (See also Electrical Apparatus and Equipment.)

General Electric Co., Schenectady, N. Y.

## MOTORS, ELECTRIC (Also see Electrical Apparatus and Equipment.)

Boisier Electric Co., L. I. City, New York.

Euger Electric Co., Watertown, N. Y.

General Electric Co., Schenectady, N. Y.

Munning, A. P., &amp; Co., New York-Chicago.

## MOTOR-GENERATOR SETS (Also see Dynamos; Electrical Apparatus and Equipment.)

Ayer-O'Connell Corp., Meriden, Conn.

Boisier Electric Co., L. I. City, New York.

Connecticut Dynamo &amp; Motor Co., Irvington, N. J.

Crown Rheostat &amp; Supply Co., Chicago, Ill.

Eager Electric Co., Watertown, N. Y.

General Electric Co., Schenectady, N. Y.

Hanson &amp; Van Winkle Co., Newark, N. J.

Jantz &amp; Leist Electric Co., Cincinnati, Ohio.

Munning, A. P., &amp; Co., New York-Chicago.

## MUNTZ'S METAL (See Sheets.)

## NICHROME HEAT RESISTING ALLOYS (See Castings; Dipping Baskets, Wire.)

## NICKEL (See Anodes; Castings; Ingots; Sheets; Wire; Etc.)

## NICKEL, BORONIC

American Boron Products Co., Reading, Pa.

## NICKEL SALTS

American Platers' Supply Co., Chicago, Ill.

Apothecaries Hall Co., Waterbury, Conn.

Cooper, Chas., &amp; Co., New York.

Crown Rheostat &amp; Supply Co., Chicago, Ill.

Ely, C., Upham, New York.

General Platers Supply Co., New York.

Hanson &amp; Van Winkle Co., Newark, N. J.

Harshaw, Fuller &amp; Goodwin Co., Cleveland, Ohio.

Hunt, Philip A., Co., New York.

Munning, A. P., &amp; Co., New York-Chicago.

Roessler &amp; Hasslacher Chemical Co., New York.

Stevens, Frederic B., Detroit, Mich.

Wiarda, John C., &amp; Co., Brooklyn, N. Y.

Woodison, E. J., Co., Detroit, Mich.

## NICKEL SILVER (See also Brass, Sheets, Wire, Rod, Tube; Castings; Forgings; Sheets; Etc.)

Sheet, Wire, Rod, Tube

American Brass Co., Waterbury, Conn.

## OHMMETERS

Weston Electrical Instrument Co., Newark, N. J.

## OIL BURNERS (See Burners)

## OIL BURNING SYSTEMS

Wayne Oil Tank &amp; Pump Co., Ft. Wayne, Ind.

## OIL PUMPS (See Oil Storage Systems.)

## OIL STORAGE AND PUMPING SYSTEMS

Buckeye Products Co., Cincinnati, Ohio.

Monarch Engineering &amp; Mfg. Co., Baltimore, Md.

Wayne Oil Tank &amp; Pump Co., Ft. Wayne, Ind.

## OLD METALS (See Drosses, Residues, Etc., Buyers of; Metal Dealers.)

## ORE SEPARATORS

Dings Magnetic Separator Co., Milwaukee, Wis.

## OVENS (Also see Burners; also Core Ovens.)

Enameling, Lacquering, Japanning

Gehrich Indirect Heat Oven Co., Long Island City, N. Y.

Steiner, E., &amp; Co., Newark, N. J.



# BUYERS' GUIDE: ADVERTISERS' PRODUCTS

**OVEN BURNERS** (See Burners.)

**OVEN INSULATION** (See Brick, Insulating; Insulating Cement; Insulation.)

**OXIDIZING MATERIALS**

Sulphur Products Co., Greensburg, Pa.

**OXIDIZING SOLUTIONS**

Sulphur Products Co., Greensburg, Pa.

**PAINT OIL STORAGE SYSTEMS**

Wayne Oil Tank & Pump Co., Ft. Wayne, Ind.

**PAINT SPRAYERS** (See Sprayers.)

**PARTING COMPOUNDS**

Buckeye Products Co., Cincinnati, Ohio.  
Obermayer, S., Co., Pittsburgh, Pa.

**PATENT ATTORNEY**

Boyle, John, Jr., Washington, D. C.

**PATTERN SHOP EQUIPMENT** (See Lathes; Saws.)

**PAVING BRICK, CORK** (See Brick.)

**PHOSPHOR BRONZE** (Also see Ingots.)

Birkenstein, S., & Sons, Chicago, Ill.  
Damascus Bronze Co., Pittsburgh, Pa.

**PHOSPHORIZERS** (See Graphite Products.)

**PHOSPHOR-COPPER** (Also see Ingots.)

Electric Smelting & Aluminum Co., Lockport, N. Y.  
Lang, R. F., New York.  
Richards & Co., Boston, Mass.  
United American Metals Corporation, Brooklyn, N. Y.

**PHOSPHOR-COPPER, BORONIC**

American Boron Products Co., Reading, Pa.

**PHOSPHOR-TIN** (Also see Ingots.)

Damascus Bronze Co., Pittsburgh, Pa.  
Electric Smelting & Aluminum Co., Lockport, N. Y.  
Lang, R. F., New York.  
Richards & Co., Boston, Mass.  
United American Metals Corporation, Brooklyn, N. Y.

**PHOSPHOR-TIN, BORONIC**

American Boron Products Co., Reading, Pa.

**PHOSPHORUS**

General Chemical Co., Philadelphia, Pa.

**PICKLING COMPOUND** (Also see Cleaning Compounds.)

Hanson & Van Winkle Co., Newark, N. J.

**PICKLING MACHINES, AUTOMATIC**

No-Dust Drying Machine Co., Providence, R. I.  
U. S. Electro Galvanizing Co., Brooklyn, N. Y.

**PIPE**

Aluminum  
Aluminum Company of America, Pittsburgh, Pa.

**PIPE AND BOILER COVERINGS, STEAM, ICE WATER, BRINE** (See also Insulation.)

**PIPE LINE REGISTERING MEASURER (METERS)**

Wayne Oil Tank & Pump Co., Ft. Wayne, Ind.

**PLATED AND POLISHED SHEET METALS** (See also Sheets.)

American Nickeloid Co., Peru, Ill.  
Apollo Metal Works, La Salle, Ill.  
National Sheet Metal Co., Peru, Ill.

**PLATERS' BRUSHES** (See Brushes.)

**PLATERS' COMPOUND** (See Whale Oil Soap.)

**PLATING AND GALVANIZING MACHINES, AUTOMATIC** (Also see Plating Barrel.)

Galvanizing Corporation of America, Brooklyn, N. Y.  
Hanson & Van Winkle Co., Newark, N. J.  
Munzing, A. P., & Co., New York-Chicago.  
National Galvanizing & Plating Equipment Corp., New York.  
U. S. Electro Galvanizing Co., Brooklyn, N. Y.

**PLATING AND GALVANIZING BARRELS**

Ayer-O'Connell Corp., Meriden, Conn.  
Boissier Electric Co., L. I. City, New York.  
Connecticut Dynamo & Motor Co., Irvington, N. J.  
Hanson & Van Winkle Co., Newark, N. J.  
Munzing, A. P., & Co., New York-Chicago.  
National Steel Products Co., Dayton, O.  
St. Louis Platers Supply Co., St. Louis, Mo.  
U. S. Electro Galvanizing Co., Brooklyn, N. Y.

**PLATING, BARREL METHOD, JOB AND CONTRACT** (Also see Electroplating.)

Flavin, Wm. H., & Co., New York.  
Sievering, Philip, New York.

**PLATING BARRELS, ROTARY**

St. Louis Platers Supply Co., St. Louis, Mo.

**PLATING EQUIPMENT AND SUPPLIES** (See Kind Wanted.)

**PLATINUM** (See Smelters and Refiners; Anodes; Bars; Metal Dealers; Sheets; Etc.)

**PLATINUM BUFFING CAKE** (See also Buffing and Polishing Compositions.)  
Munzing, A. P., & Co., New York-Chicago.

**PLATINUM SCRAP** (See Metal Dealers.)

**PLUMBAGO** (See Graphite Products.)

**POLISHING BARRELS** (See Burnishing Barrels.)

**POLISHING BELTS, ENDLESS**

Ames Sward Co., Chicopee, Mass.  
Hanson & Van Winkle Co., Newark, N. J.  
Munzing, A. P., & Co., New York-Chicago.

**POLISHING COMPOSITION** (See Buffing and Polishing Compositions.)

**POLISHING DUST COLLECTING OUTFITS** Small  
Leiman Bros., New York.

**POLISHING EQUIPMENT AND SUPPLIES** (See also Kinds Wanted.)

Flavin, Wm. H., & Co., New York.

**POLISHING HOODS** (See Dust Collectors and Ventilating Systems; Hoods.)

**POLISHING LATHES AND HEADS**

American Platers' Supply Co., Chicago, Ill.  
Ayer-O'Connell Corp., Meriden, Conn.  
Connecticut Dynamo & Motor Co., Irvington, N. J.  
Crown Rheostat & Supply Co., Chicago, Ill.  
Eager Electric Co., Watertown, N. Y.  
Excelsior Tool & Machine Co., E. St. Louis, Ill.  
Green, W., Electric Co., New York.  
Hanson & Van Winkle Co., Newark, N. J.  
Munzing, A. P., & Co., New York-Chicago.  
Prybitt, P., Machine Co., New York.

**POLISHING MACHINES** (Also see Polishing Lathes and Heads.)

Automatic  
Excelsior Tool & Machine Co., E. St. Louis, Ill.

**POLISHING MEAL FOR DRY BARREL TUMBLING**

Peckham Mfg. Co., Newark, N. J.

**POLISHING AND BURNISHING; JOB AND CONTRACT** (See also Electro Plating.)

Cohan-Epner Co., New York.  
Sievering, Philip, New York.  
Wernick Brothers, New York.

**POLISHING WHEEL DRESSING MACHINE**

Divine Bros. Co., Utica, N. Y.

**POLISHING WHEELS** (See Buffing and Polishing Wheels.)

**POLISHING AND GRINDING ENGINEERS** (See Engineers.)

**POLYSULPHIDE**

Roesler & Hasselacher Chemical Co., New York.

**POTASH**

International Chemical Co., Philadelphia, Pa.

**POWDERED METALS**

Aluminum  
Aluminum Company of America, Pittsburgh, Pa.  
Kemp, W. H., Co., New York.  
Bronze  
Du Pont, E. I., de Nemours & Co., Wilmington, Del.

**POWDERED COAL BURNERS** (See Burners.)

**POWDERED COAL BURNING SYSTEMS**  
Quigley Furnace Specialties Co., New York.

**PRESSERS** (Also see Scrap Baling Machine.)

Bench and Foot  
Baird Machine Co., Bridgeport, Conn.  
Bliss, E. W., & Co., Brooklyn, N. Y.  
Shuster, F. B., Co., New Haven, Conn.

Drop  
Miner & Peck Mfg. Co., Derby, Conn.

Hydraulic  
Waterbury Farrel Foundry & Machine Co., Waterbury, Conn.

Power, all Types  
Watson-Stillman Co., New York.

Baird Machine Co., Bridgeport, Conn.  
Bliss, E. W., Co., Brooklyn, N. Y.  
Garrison, A., Foundry Co., Pittsburgh, Pa.  
Waterbury Farrel Foundry & Machine Co., Waterbury, Conn.

**PRESSURE BLOWERS** (See Blowers and Blow-Piping.)

**PULLEYS, MAGNETIC**

Dings Magnetic Separator Co., Milwaukee, Wis.

**PUMPS, POWER DRIVEN—OIL, GASOLINE**

Wayne Oil Tank & Pump Co., Ft. Wayne, Ind.

**PUMPS, SELF MEASURING**

Wayne Oil Tank & Pump Co., Ft. Wayne, Ind.

**PYROMETERS**

Taylor Instrument Companies, Rochester, N. Y.

**PYROSCOPES** (Also see Pyrometers.)  
Shore Instrument Co., Jamaica, N. Y.

**RARE METALS** (See Metal Dealers.)

**RECLAIMING MACHINERY, METAL** (Also see Concentrating Tables; Crushers and Pulverizers; Magnetic Separators.)  
Eastern Machinery Co., New Haven, Conn.  
Hardinge Company, New York.  
Magnetic Mfg. Co., Milwaukee, Wis.  
Paxson, J. W., Co., Philadelphia, Pa.  
Standard Equipment Co., New Haven, Conn.

**RECORDING THERMOMETERS** (See Thermometers.)

**REFINERS AND SMELTERS** (See Smelters and Refiners.)

**RESPIRATORS**

American-La France Fire Engine Co., Inc., Elmira, N. Y.

**RETORTS, GRAPHITE**

Dixon, Joseph, Crucible Co., Jersey City, N. J.  
Gautier, J. H., & Co., Jersey City, N. J.  
McCullough-Daisell Crucible Co., Pittsburgh, Pa.

**RHEOSTATS** (See also Electrical Apparatus and Equipment.)

Boissier Electric Co., L. I. City, New York.  
Connecticut Dynamo & Motor Co., Irvington, N. J.  
Crown Rheostat & Supply Co., Chicago, Ill.  
Eager Electric Co., Watertown, N. Y.  
General Electric Co., Schenectady, N. Y.  
Munzing, A. P., & Co., New York-Chicago.

**RIDDLES** (See Foundry Riddles.)

**RIVET HEATERS, ELECTRIC**

General Electric Co., Schenectady, N. Y.

**RIVETING MACHINES**

Shuster, F. B., Co., New Haven, Conn.

**RIVETS, NAILS & TACKS, ALL METALS**

Hassall, John, Inc., Brooklyn, N. Y.

**RODS AND BARS** (Also see Brass Mill Products.)

Aluminum  
Aluminum Company of America, Pittsburgh, Pa.  
British Aluminum Co., Ltd., New York-Toronto, Can.  
Electric Smelting & Aluminum Co., Lockport, N. Y.  
Strahs Aluminum Co., New York.

**Brass, Bronze and Copper**

American Brass Co., Waterbury, Conn.  
Chase Metal Works, Waterbury, Conn.  
Scovill Mfg. Co., Waterbury, Conn.  
Standard Underground Cable Co., Pittsburgh, Pa.

**ROLLING MILL MACHINERY** (See Draw Benches; Hydraulic Machinery; Presses; Rolls; Shears; Slitters.)

**ROLLS**

Chilled and Sand Iron  
Garrison, A., Foundry Co., Pittsburgh, Pa.  
Jewelers'  
Garrison, A., Foundry Co., Pittsburgh, Pa.  
Leiman Bros., New York.

**ROLLS AND COILS** (See Sheets and Strip Metal.)

**ROUGE** (Also see Buffing and Polishing Compositions.)

Hanson & Van Winkle Co., Newark, N. J.  
Munzing, A. P., & Co., New York-Chicago.

**RUST PREVENTATIVES**

Oakley Chemical Co., New York.

**SAFETY DEVICES AND APPAREL**

Respirators  
American-La France Fire Engine Co., Inc., Elmira, N. Y.

**SAND**

Molding  
Paxson, J. W., Co., Philadelphia, Pa.  
Woodison, E. J., Co., Detroit, Mich.

**For Sand Blasting**

Pangborn Corporation, Hagerstown, Md.  
Standard Equipment Co., New Haven, Conn.  
Woodison, E. J., Co., Detroit, Mich.

**SAND BLASTS**

Accessories and Supplies  
Mott Sand Blast Mfg. Co., Brooklyn, N. Y.  
New Haven Sand Blast Co., New Haven, Conn.  
Pangborn Corporation, Hagerstown, Md.

**Barrel**

Hoovel Mfg. Corporation, Jersey City, N. J.  
Mott Sand Blast Mfg. Co., Brooklyn, N. Y.  
New Haven Sand Blast Co., New Haven, Conn.  
Pangborn Corporation, Hagerstown, Md.  
Paxson, J. W., Co., Philadelphia, Pa.



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**Cabinet**

Astle, H. J., & Co., Providence, R. I.  
Lelman Bros., New York.  
Mott Sand Blast Mfg. Co., Brooklyn, N. Y.  
Pangborn Corporation, Hagerstown, Md.  
Paxson, J. W., Co., Philadelphia, Pa.

**Car**

Pangborn Corporation, Hagerstown, Md.

**Revolving Table**

Hoebel Mfg. Corporation, Jersey City, N. J.  
Mott Sand Blast Mfg. Co., Brooklyn, N. Y.  
Pangborn Corporation, Hagerstown, Md.

**Sand Blast Systems**

American Foundry Equipment Co., New York.  
Mott Sand Blast Mfg. Co., Brooklyn, N. Y.  
New Haven Sand Blast Co., New Haven, Conn.  
Pangborn Corporation, Hagerstown, Md.

**SAND CUTTING MACHINES**

American Foundry Equipment Co., New York.

**SAND DRYERS**

Pangborn Corporation, Hagerstown, Md.

**SAND MIXERS**

American Foundry Equipment Co., New York.  
Wadsworth Core Machine & Equipment Co., Akron, Ohio.

**SAND SIFTERS**

American Foundry Equipment Co., New York.  
Pangborn Corporation, Hagerstown, Md.  
Wadsworth Core Machine & Equipment Co., Akron, Ohio.

**SASH, STEEL**

Lupton's, David, Sons Co., Philadelphia, Pa.

**SASH OPERATING DEVICES**

Lupton's, David, Sons Co., Philadelphia, Pa.

**SAWDUST, HARD AND SOFT**

National Sawdust Co., Brooklyn, N. Y.

**SAWDUST DRYING-OUT BOXES (Also see Drying-Out Machines.)**

Smith-Richardson Co., Attleboro, Mass.

**SAWDUST, DUSTLESS FOR DRYING OUT METAL GOODS**

National Sawdust Co., Brooklyn, N. Y.

**SAWDUSTLESS METAL DRYERS**

Tolhurst Machine Co., Troy, N. Y.

**SAWS**

**Metal Band**  
Prybil, P., Machine Co., New York.

**SCLEROSCOPES**

Shore Instrument Co., Jamaica, N. Y.

**SCRAP METAL DEALERS (See Drosses, Residues, Etc., Buyers of; Turnings, Chips, Etc., Buyers of; Metal Dealers.)****SCREW MACHINE PRODUCTS (Also see Machined Products.)**

Economy Machine Products Co., Chicago, Ill.  
Globe Machine & Stamping Co., Cleveland, Ohio.

**SEPARATOR, ABRASIVE**

Pangborn Corporation, Hagerstown, Md.

**SEPARATORS, MAGNETIC (See also Magnetic Separators.)**

Dings Magnetic Separator Co., Milwaukee, Wis.

**SHEARS (Also see Slitters.)**

**Power**  
Bliss, E. W., Co., Brooklyn, N. Y.  
Waterbury Farrell Foundry & Machine Co., Waterbury, Conn.

**SHEEPSKIN POLISHING WHEELS**

Yorkville Mfg. Co., Brooklyn, N. Y.  
Metal Industries Supply Co., Indianapolis, Ind.

**SHEET METAL PIPING FOR ALL PURPOSES**

No-Dust-Drying Machine Co., Providence, R. I.

**SHEETS (Also see Brass Mill Products; Strip Metal.)**

**Aluminum**  
Aluminum Company of America, Pittsburgh, Pa.  
British Aluminum Co., Ltd., New York-Toronto, Canada.  
Electric Smelting & Aluminum Co., Lockport, N. Y.  
Kemp, W. H., Co., New York.  
Strauss Aluminum Co., New York.

**Brass, Copper and Nickel Silver**  
American Brass Co., Waterbury, Conn.  
Benson, H. K., & F. S., Glen Ridge, N. J.  
Bristol Brass Co., Bristol, Conn.  
Chase Metal Works, Waterbury, Conn.  
Dallas Brass & Copper Co., Chicago, Ill.  
Manhattan Brass & Copper Co., New York.  
Metal Purchasing Co., New York.  
New England Brass Co., Taunton, Mass.  
Scott Mfg. Co., Waterbury, Conn.  
Western Cartridge Co., East Alton, Ill.

**Britannia Metal**

Standard Rolling Mills, Inc., Brooklyn, N. Y.

**Bronze**

New England Brass Co., Taunton, Mass.

**Copper**

Baltimore Copper Smelting & Rolling Co., Baltimore, Md.  
Hussey, C. G., & Co., Pittsburgh, Pa.  
National Brass & Copper Co., Lisbon, Ohio.

**Muntz's Metal**

Taunton-New Bedford Copper Co., Taunton, Mass.

**Nickel**

Driver-Harris Co., Harrison, N. J.

**Nickel-Silver**

Dueber Watch Case Mfg. Co., Canton, Ohio.  
New England Brass Co., Taunton, Mass.  
Seymour Mfg. Co., Seymour, Conn.

**Plated and Polished**

American Nickeloid Co., Peru, Ill.  
Apollo Metal Works, La Salle, Ill.  
National Sheet Metal Co., Peru, Ill.

**Platinum**

Roessler & Hasslacher Chemical Co., New York.

**Silver Metal**

Silver Metal Mfg. Co., New York.

**Silver, Sterling**

Handy & Harmon, New York.  
Jackson, John J., Co., Newark, N. J.

**Zinc**

American Zinc Products Co., Greencastle, Ind.  
Illinois Zinc Co., Peru, Ill.  
Matthiesen & Hegeler Zinc Co., La Salle, Ill.  
New Jersey Zinc Co., New York.  
Platt Bros. Co., Waterbury, Conn.

**SIGNS, METAL SAFETY**

American-La France Fire Engine Co., Inc., Elmira, N. Y.

**SILICON-COPPER**

Electric Smelting & Aluminum Co., Lockport, N. Y.  
Lang, R. F., New York.

**Boronic**

American Boron Products Co., Reading, Pa.

**SILVEL METAL**

Silver Metal Mfg. Co., New York.

**SILVER (See Smelters and Refiners; Anodes; Bars; Castings; Ingots; Metal Dealers; Sheets; Solder; Etc.)****SILVER, BORONIC**

American Boron Products Co., Reading, Pa.

**SILVER CYANIDE**

Roessler & Hasslacher Chemical Co., New York.

**SILVERSMITHS' BRUSHES (See Brushes.)****SLAB ZINC**

American Zinc, Lead & Smelting Co., Boston, Mass.  
Hegeler Zinc Co., Danville, Ill.  
Illinois Zinc Co., Peru, Ill.  
Matthiesen & Hegeler Zinc Co., La Salle, Ill.  
New Jersey Zinc Co., New York.

**SLAG CRUSHERS (See Crushers and Pulverizers.)****SLITTERS, SHEET METAL (Also see Shears.)**

Torrington Manufacturing Co., Waterbury, Conn.

**SMELTERS AND REFINERS (Also see Ingots.)****Copper-Bearing Material**

Copper, Pass & Son, Ltd., Bristol, England.  
Girard Smelting & Refining Co., Philadelphia, Pa.  
Great Western Smelting & Refining Co., St. Louis, Mo.  
Loewenthal Co., Chicago, Ill.  
North American Smelting Co., Philadelphia, Pa.  
Whipple & Choate, Bridgeport, Conn.

**Gold**

Handy & Harmon, New York.  
Ney, J. M., Co., Hartford, Conn.

**Platinum**

Roessler & Hasslacher Chemical Co., New York.

**Silver**

Handy & Harmon, New York.  
Ney, J. M., & Co., Hartford, Conn.

**White Metals**

Girard Smelting & Refining Co., Philadelphia, Pa.  
Great Western Smelting & Refining Co., St. Louis, Mo.  
Michigan Smelting & Refining Co., Detroit, Mich.  
North American Smelting Co., Philadelphia, Pa.  
Union Smelting & Refining Co., Inc., Newark, N. J.

**Zinc**

New Jersey Zinc Co., New York.

**SOAP AND SOAP CHIPS**

International Chemical Co., Philadelphia, Pa.

**SODA, MODIFIED**

Solvay Process Co., Syracuse, N. Y.

**SODA ASH**

Hunt, Philip A., Co., New York.  
Roessler & Hasslacher Chemical Co., New York.  
Solvay Process Co., Syracuse, N. Y.

**SODIUM CYANIDE**

Hunt, Philip A., Co., New York.  
Roessler & Hasslacher Chemical Co., New York.

**SOLDER****Aluminum**

Aluminum Company of America, Pittsburgh, Pa.  
Union Smelting & Refining Co., Inc., Newark, N. J.

**Ribbon**

Union Smelting & Refining Co., Inc., Newark, N. J.

**Silver**

Ney, J. M., & Co., Hartford, Conn.

**Tinners**

Michigan Smelting & Refining Co., Detroit, Mich.  
Union Smelting & Refining Co., Inc., Newark, N. J.  
United American Metals Corporation, Brooklyn, N. Y.  
U. S. Reduction Co., Chicago, Ill.

**Wire**

Union Smelting & Refining Co., Inc., Newark, N. J.

**SOLDER MOLDS (See Molds.)****SOLDERING FLUX (See Fluxes.)****SOLDERING, ZINC**

New Jersey Zinc Co., New York.

**SOLUTIONS—OXIDIZING**

Solvay Process Co., Syracuse, N. Y.

**SOLVENTS**

Celluloid Zapon Co., New York.

**SPECIALTIES, METAL (See Wire Specialties; Wire Shapes and Forms; Metal Goods Made to Order.)****SPELTER (See Slab Zinc; also see Ingots.)****SPELTER SOLDER (See Solder Brazing.)****SPINNING CHUCKS (See Chucks.)****SPINNING LATHES (See Lathes.)****SPOUTS, MAGNETIC**

Dings Magnetic Separator Co., Milwaukee, Wis.

**SPRAYERS****Foundry**

De Vilbiss Mfg. Co., Toledo, Ohio.  
Malleable Iron Fittings Co., Branford, Conn.

**Lacquer, Enamel, Japan, Paint**

De Vilbiss Mfg. Co., Toledo, Ohio.  
Eclipse Air Brush Co., Newark, N. J.  
Economy Machine Products Co., Chicago, Ill.  
Eureka Pneumatic Spray Co., New York.  
Holton, B., Co., Los Angeles, Cal.  
Nikolas, G. J., Co., Chicago, Ill.  
Universal Sprayer Co., New York.

**SPRAYING, ACCESSORIES, HOODS, TABLES, ETC.**

De Vilbiss Mfg. Co., Toledo, Ohio.  
Eclipse Air Brush Co., Newark, N. J.  
Holton, B., Co., Los Angeles, Cal.

**SPRAYING EQUIPMENT, PORTABLE**

De Vilbiss Mfg. Co., Toledo, Ohio.

**SPRUE CUTTERS (See also Saws.)**

Shuster, F. B., Co., New Haven, Conn.  
Turner Machine Co., Philadelphia, Pa.

**STAMPING AND DRAWING, JOB AND CONTRACT (Also see Metal Goods Made to Order.)**

Bridgeport Brass Co., Bridgeport, Conn.  
Globe Machine & Stamping Co., Cleveland, Ohio.  
Kenworthy, Charles F., Inc., Waterbury, Conn.  
Western Cartridge Co., East Alton, Ill.

**STAMPING STEEL, COLD ROLLED**

Hogan, John R., Co., Philadelphia, Pa.

**STEEL BALLS FOR BURNISHING BARRELS**

Abbott Ball Co., Hartford, Conn.  
Baird Machine Co., Bridgeport, Conn.  
Crown Rheostat & Supply Co., Chicago, Ill.  
Globe Machine & Stamping Co., Cleveland, Ohio.  
Henderson Bros. Co., Waterbury, Conn.  
No-Dust-Drying Machine Co., Providence, R. I.  
Smith-Richardson Co., Attleboro, Mass.

# BUYERS' GUIDE: ADVERTISERS' PRODUCTS

**STEEL, BORONIC**

American Boron Products Co., Reading, Pa.

**STEEL, COLD ROLLED STAMPING**

Hogan, John R., Co., Philadelphia, Pa.

**STEEL SASH**

Lupson's, David, Sons Co., Philadelphia, Pa.

**STIRRERS (See Graphite Products.)****STONEWARE, ACID-PROOF (See Acid Pumps; Dipping Baskets.)****STRAIGHTENING, CUTTING AND FORMING MACHINERY (See Cutting, Straightening and Forming Machinery.)****STRIP METAL IN COILS AND ROLLS (Also see Brass Mill Products.)****Aluminum**

Aluminum Co. of America, Pittsburgh, Pa.

**Brass, Copper and Nickel Silver**

American Brass Co., Waterbury, Conn.

New England Brass Co., Taunton, Mass.

New Jersey Tube Co., Harrison, N. J.

Scovill Mfg. Co., Waterbury, Conn.

**Copper**

National Brass &amp; Copper Co., Lisbon, Ohio.

**Zinc**

New Jersey Zinc Co., New York.

Platt Bros. Co., Waterbury, Conn.

**SULPHATE OF ALUMINUM**

Roessler &amp; Hasslacher Chemical Co., New York.

**SULPHITE OF COPPER**

Celluloid Zapon Co., New York.

Hanson &amp; Van Winkle Co., Newark, N. J.

Hunt, Philip A., Co., New York.

Ward, John C., &amp; Co., Brooklyn, N. Y.

**SULPHITE OF POTASSIUM**

Buchanan, C. G., Chemical Co., Cincinnati, Ohio.

**SULPHOCYANIDE OF SODA**

Celluloid Zapon Co., New York.

Roessler &amp; Hasslacher Chemical Co., New York.

**SWEET SMELTERS (See Smelters and Refiners.)****SWITCHBOARDS (See also Electrical Apparatus and Equipment.)**

Eager Electric Co., Watertown, N. Y.

General Electric Co., Schenectady, N. Y.

**SYNCHROSCOPES**

Weston Electrical Instrument Co., Newark, N. J.

**TANK FURNACES**

Improved Appliance Co., Brooklyn, N. Y.

**TANKS****Fuel Oil Storage**

Wayne Oil Tank &amp; Pump Co., Ft. Wayne, Ind.

**Hot Galvanizing & Tinning**

New Standard Hardware Works, Mount Joy, Pa.

**Lead Lined**

Chadwick-Boston Co., Boston, Mass.

**Steel**

Curtiss-Willis Co., Inc., New York.

Munning, A. P., &amp; Co., New York-Chicago.

**Storage, Oil, Etc.**

Wayne Oil Tank &amp; Pump Co., Ft. Wayne, Ind.

**Wood**

American Platers' Supply Co., Chicago, Ill.

Atlantic Tank &amp; Barrel Corp., Hoboken, N. J.

Corcoran, A. J., &amp; Co., Jersey City, N. J.

Curtiss-Willis Co., Inc., New York.

Hanson &amp; Van Winkle Co., Newark, N. J.

Kalamazoo Tank &amp; Silo Co., Kalamazoo, Mich.

Munning, A. P., &amp; Co., New York-Chicago.

National Galvanizing &amp; Plating Equipment Corp., New York.

National Steel Products Co., Dayton, O.

Passaic Carpenter &amp; Millwright Shop, Passaic, N. J.

Stearns, A. T., Lumber Co., Boston, Mass.

U. S. Electro Galvanizing Co., Brooklyn, N. Y.

**TESTING APPARATUS (See Calipers, Indicating; Pyrometers; Scleroscopes; Thermometers.)****TESTING LABORATORIES (See also Assayers and Chemists.)****Chemical**

Norton Laboratories, New York.

Ricketts &amp; Co., Ltd., New York.

**THERMIT**

Metal &amp; Thermit Corporation, New York.

**THERMOMETERS**

Taylor Instrument Companies, Rochester, N. Y.

**TIN; FIG. BAR AND BLOCK (See also Ingots, Tin.)**

Union Smelting &amp; Refining Co., Inc., Newark, N. J.

**TINNING (See Electro-Plating, Hot Galvanizing and Tinning.)****TINNING FURNACES (See Galvanizing and Tinning Furnaces.)****TINNING FLUXES (See Fluxes.)****TOOL HARDENING FURNACES (See Heat Treating Furnaces.)****TRIPOLI, LUMP AND GROUND**

American Tripoli Co., Seneca, Mo.

**TROLLEYS (See Overhead Trolley Systems.)****TRUCK AND WAGON LOADERS**

Portable Machinery Co., Passaic, N. J.

**TRUCK WHEELS**

Divine Bros. Co., Utica, N. Y.

**TUBES (Also see Brass Mill Products.)****Aluminum**

Aluminum Company of America, Pittsburgh, Pa.

**Brass, Bronze and Copper**

American Brass Co., Waterbury, Conn.

Rome Hollow Wire &amp; Tube Co., Rome, N. Y.

Scovill Mfg. Co., Waterbury, Conn.

Standard Underground Cable Co., Pittsburgh, Pa.

Wheeler Condenser &amp; Engineering Co., Carteret, N. J.

**Brass and Copper, Small Sizes**

Rome Hollow Wire &amp; Tube Co., Rome, N. Y.

**Condenser**

Wheeler Condenser &amp; Engineering Co., Carteret, N. J.

**TUMBLING BARRELS (Also see Burnishing and Polishing Barrels; Plating Barrels.)****All Kinds**

Baird Machine Co., Bridgeport, Conn.

Globe Machine &amp; Stamping Co., Cleveland, Ohio.

Hanson &amp; Van Winkle Co., Newark, N. J.

**Dry Tumbling**

Universal Chain Co., Stroudsburg, Pa.

**Foundry**

Baird Machine Co., Bridgeport, Conn.

Globe Machine &amp; Stamping Co., Cleveland, Ohio.

Henderson Bros. Co., Waterbury, Conn.

Wadsworth Core Machine &amp; Equipment Co., Akron, Ohio.

**Japanning**

Baird Machine Co., Bridgeport, Conn.

Globe Machine &amp; Stamping Co., Cleveland, Ohio.

Henderson Bros. Co., Waterbury, Conn.

**Lacquering**

Baird Machine Co., Bridgeport, Conn.

Globe Machine &amp; Stamping Co., Cleveland, Ohio.

Henderson Bros. Co., Waterbury, Conn.

**Oblique**

Baird Machine Co., Bridgeport, Conn.

Globe Machine &amp; Stamping Co., Cleveland, Ohio.

Henderson Bros. Co., Waterbury, Conn.

Munning, A. P., &amp; Co., New York-Chicago.

**TURBINES, CURTIS, STEAM**

General Electric Co., Schenectady, N. Y.

**TURNINGS, CHIPS, ETC., BUYERS OF (Also see Drosses, Residues, Etc., Buyers of; Metal Dealers.)****TURPENTINE**

Apothecaries Hall Co., Waterbury, Conn.

**TYPE METAL (Also see Ingots.)****Sterotype and Linotype**

Union Smelting &amp; Refining Co., Inc., Newark, N. J.

**UNLOADERS AND CAR UNLOADERS**

Portable Machinery Co., Passaic, N. J.

**VACUUM PUMPS, ROTARY**

Leiman Bros., New York.

**VARNISHES FOR ALL PURPOSES**

Hilo Varnish Corporation, Brooklyn, N. Y.

**VENTILATING SYSTEMS (See Blowers and Blow Piping; Dust Collectors and Ventilating Systems; Exhaust Fans and Heads.)****VIBRATORS**

Bennett &amp; Seelay, Bridgeport, Conn.

Buckeye Products Co., Cincinnati, Ohio.

Campbell-Hausfeld Co., Harrison, Ohio.

Malleable Iron Fittings Co., Branford, Conn.

Osborn Manufacturing Co., Cleveland, Ohio.

Woodison, E. J. Co., Detroit, Mich.

**VIENNA LIME COMPOSITIONS (See Buffing and Polishing Compositions.)****VOLTMETERS (Also see Electrical Apparatus and Equipment.)**

Connecticut Dynamo &amp; Motor Co., Irvington, N. J.

Eager Electric Co., Watertown, N. Y.

Hanson &amp; Van Winkle Co., Newark, N. J.

Munning, A. P., &amp; Co., New York-Chicago.

Weston Electrical Instrument Co., Newark, N. J.

**WASHING MACHINE, METAL PARTS**

Crescent Washing Machine Co., New Rochelle, N. Y.

No-Dust Drying Machine Co., Providence, R. I.

**WASTE CLEANER AND OIL RECLAIMER**

Oakley Chemical Co., New York.

**WATTMETERS**

Weston Electrical Instrument Co., Newark, N. J.

**WELDING APPARATUS, ELECTRIC**

General Electric Co., Schenectady, N. Y.

**WET MAGNETIC SEPARATORS**

Dings Magnetic Separator Co., Milwaukee, Wis.

**WHALE OIL SOAP (Also see Cleaning Compounds; Fig Cleansers.)**

International Chemical Co., Philadelphia, Pa.

**WHITE METAL ALLOYS**

Union Smelting &amp; Refining Co., Inc., Newark, N. J.

**WHITE METALS (See Smelters and Refiners; Babbitt Metal; Ingots; Etc.)****WIPERS**

Ayer-O'Connell Corp., Meriden, Conn.

**WIRE MILL PRODUCTS (Also see Brass Mill Products; Wire.)**

Rome Wire Co., Rome, N. Y.

**WIRE****Aluminum**

Aluminum Company of America, Pittsburgh, Pa.

British Aluminum Co., Ltd., New York-Toronto, Canada.

Leygrand &amp; Co., New York.

**Brass, Copper and Nickel-Silver**

American Brass Co., Waterbury, Conn.

Harris, Frederick T., Providence, R. I.

Rome Wire Co., Rome, N. Y.

Scovill Mfg. Co., Waterbury, Conn.

**Nichrome**

Driver-Harris Co., Harrison, N. J.

**Special Metals**

Harris, Frederick T., Providence, R. I.

**WIRE CLOTH**

Smith, John P., &amp; Co., New Haven, Conn.

**WIRE FORMING MACHINERY (See also Cutting, Straightening and Forming Machinery.)**

Baird Machine Co., Bridgeport, Conn.

**WIRE STRAIGHTENING AND CUTTING MACHINERY (See Cutting, Straightening and Forming Machinery.)**

Baird Machine Co., Bridgeport, Conn.

**WIRE WHEEL BRUSHES (See Brushes.)****WIRING DEVICES (See Electrical Apparatus and Equipment.)****WOOD ENAMELS (See Enamels.)****WOOD LACQUERS (See Lacquers.)****WOODFILLERS, PASTE**

Hilo Varnish Corporation, Brooklyn, N. Y.

**YELLOW BRASS (See Sheets, Muntz's Metal.)****ZINC (See Slab Zinc; Smelters and Refiners; Anodes; Sheets; Strip Metal; Etc.)****ZINC, CARBONATE OF**

Hunt, Philip A., Co., New York.

**ZINC CYANIDE**

Roessler &amp; Hasslacher Chemical Co., New York.

**ZINC DUST**

New Jersey Zinc Co., New York.

**ZINC PLATING (See Electro Galvanizing.)****ZINC PRODUCTS**

New Jersey Zinc Co., New York.

**ZINC, ROLLED (Also see Sheets, Zinc.)**

New Jersey Zinc Co., New York.

**ZINC SALTS, COMMERCIAL**

Hanson &amp; Van Winkle Co., Newark, N. J.

Hunt, Philip A., Co., New York.

Munning, A. P., &amp; Co., New York-Chicago.

U. S. Electro Galvanizing Co., Brooklyn, N. Y.

**ZINC SHEETS**

American Zinc Products Co., Greencastle, Ind.

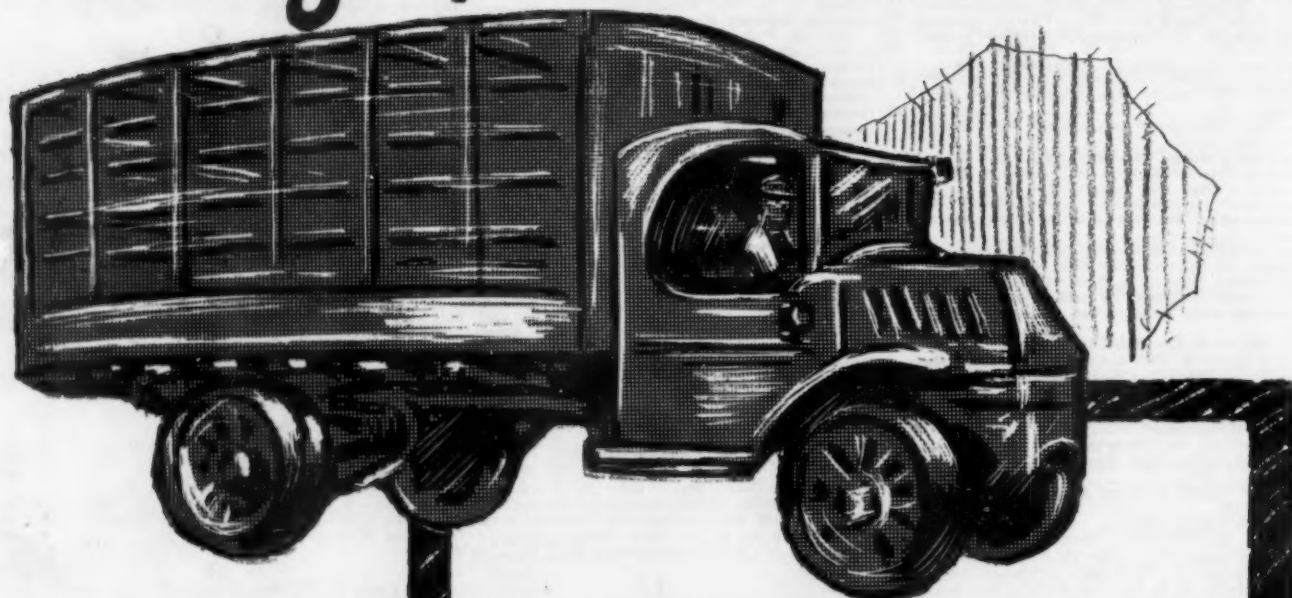


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# The Mighty 7½ Ton Mack Truck



## A NEW ADDITION 'To our FLEET'

- ☐ This mighty new 7½-ton MACK truck is the latest addition to our already large fleet of seven trucks, necessitated by a constantly increasing business. We chose the MACK because we believe it to be the greatest vehicle on the market for hauling unusually difficult loads.
- ☐ The addition of this big MACK truck is a direct indicator of the growth and expansion of the business of the Union Smelting & Refining Co., Inc., and is but the first of a series of the additional equipment being installed to facilitate the enlarged production of the finest white metal alloys in the world.
- ☐ Nothing succeeds like success—and success is only achieved by doing things better than they have ever been done before. That is where UNION leads the procession in the manufacture of white metal alloys. Not only that we are producing better goods, but giving better service, the character that YOU will appreciate. May we hear from you on the subject of white metal alloys?

### UNION SMELTING & REFINING CO., Inc.

#### MAIN WORKS:

St. Charles Street and Avenue L, Newark, New Jersey

BRANCHES: CLEVELAND, CHICAGO, BALTIMORE, DETROIT

Cable Address: SMELTERIES, N. Y. New York Office: WORLD BUILDING



# Close-Grained Castings

## Of Superior Tensile Strength

—that's what you can expect when you clarify your molten copper and your tin-bronze mixtures, with Esco Silicon Copper. Increases the fluidity of the molten metal, thereby enabling you to make sharp castings.

Prompt Shipment.  
Let Us Quote You.

## SILICON COPPER

Ingots readily  
break into  
small frag-  
ments.

ALSO PRODUCERS OF HIGH GRADE

## MANGANESE COPPER

Practically free from iron and other  
impurities. . . . .



ANTIMONY  
ANTIMONY



# ANTIMONY

... ALSO ...

"Every Metal the Brass Founder Needs"

## RICHARDS & COMPANY, Inc.

ESTABLISHED 1812

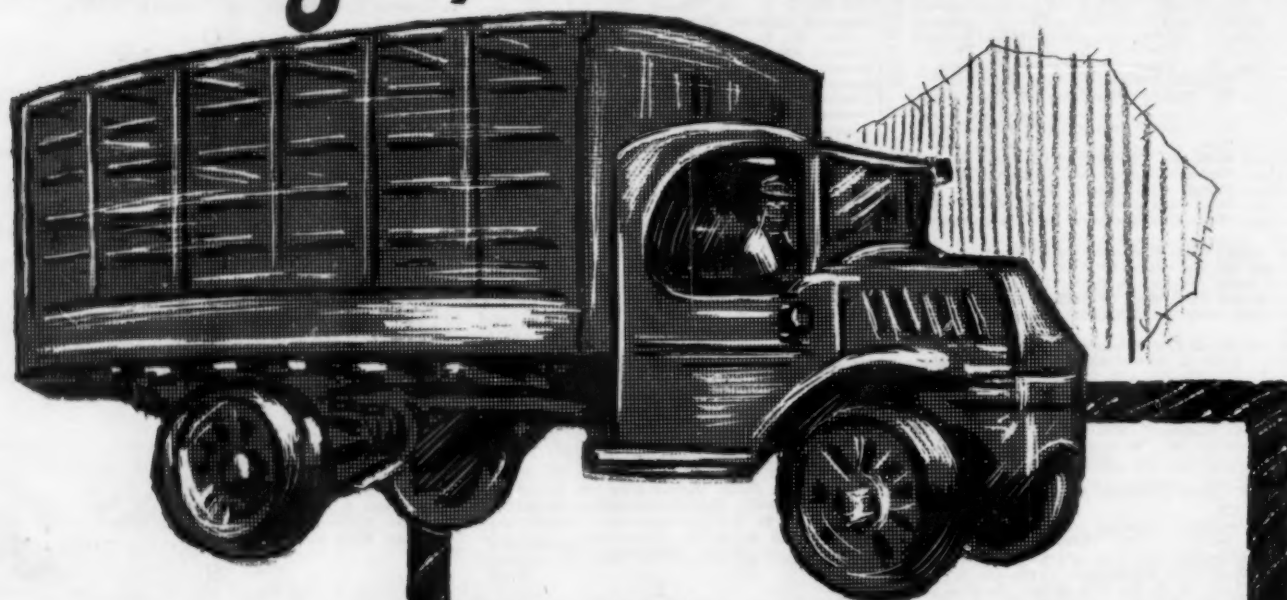
200-206 CAUSEWAY  
117-125 BEVERLY -

STREETS

## BOSTON

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PRODUCTS

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200-206 CAUSEWAY  
117-125 BEVERLY -

STREETS

**BOSTON**

# **CUT YOUR COSTS! IMPROVE YOUR WORK!! SAVE TIME!!!**

With over 40 cleaners for all branches of the Metal trade, with our 20 years experience and with real expert service we can clean any work better, more efficiently and cheaper

## **OUR EXPERT**

has recently perfected several new cleaning compounds for the metal trade. Two of these are identical with certain cleaners marketed by other companies with the exception that they do not carry any water or insoluble material in them. We can furnish these at a lower price per pound than you are at present paying besides effecting a saving in the amount of material used as the necessity for repeatedly emptying the tanks to remove any sediment is now eliminated.

**LET US QUOTE ON THE MATERIAL YOU ARE USING**

**International Chemical Company**

**CLEANERS FOR METAL WORK**

**MASCHER ST., BELOW LEHIGH AVE.**

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**LET OUR EXPERT ADVISE YOU**

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***Representatives wanted in all parts of the U. S.***

